REPORT ON AMBIENT AIR SURVEY IN SAULT ST. MARIE

JULY 1978

ARB-TDA REPORT No. 14-80

PUBLISHED AUGUST 1980

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Ministry of the Environment

The Honourable
Harry C. Parrott, D.D.S.,
Minister

Graham W. S. Scott, Q.C.,
Deputy Minister

AIR RESOURCES BRANCH

Technology Development and Appraisal Section

Monitoring and Instrumentation Development Unit

ARB - TDA Report No. 14 - 80

REPORT ON AMBIENT AIR SURVEY

IN

SAULT STE. MARIE

July 1978

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TABLE OF CONTENTS

		Page
01.	SUMMARY	1
02.	INTRODUCTION	4
03.	SOURCE DESCRIPTION	5
04.	MONITORING TECHNIQUE	7
05.	SURVEY TECHNIQUE	10
06.	MONITORING SITE LOCATIONS	11
07.	RESULTS	17
08.	DISCUSSION	33
09.	CONCLUSIONS	45
10.	APPENDIX	47

01. Summary:

As requested by the Northeastern Region, the monitoring and Instrumentation Development Unit of the Air Resources Branch conducted an ambient air monitoring survey in the city of Sault Ste. Marie during July, 1978. The purpose of this survey was to monitor reduced sulphur compounds, sulphur dioxide and suspended particulates in the vicinity of the steel mill owned and operated by the Algoma Steel Corporation Limited. Data on several other gaseous pollutants were gathered as well. Approximately 135 hours of data were accumulated and analyzed.

Air masses which passed thru Sault Ste. Marie during the survey period were generally cool, moist and unstable. Precipitation was more than 50% above normal amounts for July, and the strongest, most frequent winds during the survey period were northwesterly.

Half-hour average concentrations of sulphur dioxide (SO_2) did not exceed the Ontario Standard of 0.30 ppm at any time during the survey. The maximum ground-level concentration of SO_2 for a half-hour period was 0.26 ppm, while the mean maximum half-hour average concentration for the 22 monitoring periods was 0.08 ppm.

For the 22 monitoring periods, the mean maximum half-hour average concentration of total reduced sulphur (TRS), expressed as hydrogen sulphide (H_2S), was determined to be 0.027 ppm H_2S. The half-hour Ontario Guideline for TRS of 0.027 ppm H_2S was exceeded during 5 of the periods for a total of approximately 12 hours. The largest maximum half-hour average concentration of TRS for the survey period was 0.22 ppm.

Half-hour average concentrations of the oxides of nitrogen (NO_x) did not exceed the Ontario Standard of 0.27 ppm at any time during the survey. The largest half-hour average concentration attributable to the Algoma steel mill was 0.12 ppm.

Ground-level concentrations of ozone (0_3) exceeded the Ontario Standard of 0.10 ppm during one monitoring period only, attaining a half-hour average concentration of 0.15 ppm. The wind rose diagram for that period points to the Algoma steel mill as a possible source of 0_3, however it is felt that long-range transport from the south and southwest was probably the source.

Fifty-one samples of Total Suspended Particulate (TSP) matter were collected from a network of 6 High-Volume air samplers. Twenty of the samples were found to have TSP mass concentrations in excess of the Air Quality Criterion of 120 ug/m^3, based on a 24-hour sampling period. A maximum value of 505 ug/m^3 was attained. Each sampling location showed its maximum TSP loading when it was downwind from the Algoma steel mill.

Analysis shows that 8 of the 51 samples were exposed to mass concentrations of ferric oxide (Fe_2O_3) greater than the 24-hour Ontario Criterion of 25 ug/m^3. The maximum value for the entire survey period was 99.8 ug/m^3. Wind information indicated that the Algoma steel mill and an associated slag heap 2 km west of the steel mill are each a significant source of iron in the ambient air.

Mass concentrations of manganese (Mn) were always less than the 24-hour Ontario Air Quality Criterion of 50 ug/m^3. The maximum value for the survey period was 4.47 ug/m^3 and coincided with the period of maximum iron concentration. Analysis revealed a correlation coefficient of 0.88 between the Mn and Fe concentrations, which is indicative of a common source.

Wind information implicates the Algoma steel mill and the slag heap and by-products plants areas west of the steel mill as being the primary sources of total carbon and free carbon in the ambient air. In addition, there are relatively high background concentrations of total carbon and free carbon at each of the sampling locations.

Maximum sulphate ($SO_4^=$) concentrations for most sampler locations were in the range 40-50 ug/m^3 and occurred on the same two days, probably because of long-range transport from the south. An estimate of the concentrations from long-range transport is in the range 15-25 ug/m^3 for those two days but much less for two other days. The background level of ambient $SO_4^=$ was around 10-12 ug/m^3. Emissions from the Algoma steel mill contributed approximately 9-14 ug/m^3 $SO_4^=$ directly to the ambient air.

The mean mass concentration of silica (SiO_2) at each of 3 locations was in the range of 7.4 to 8.2 ug/m^3. At this time, a conclusive statement on SiO_2 emissions from the Algoma steel mill cannot be made.

Polycyclic aromatic hydrocabon (PAH) compounds were detected in the ambient air downwind of the Algoma steel mill. Maximum concentrations for all of the PAH compounds were in the range 9-30 ug/1000 m^3 during the 11-day survey period. For the network of sampling sites the maximum mean concentration of each of the PAH compounds was in the range 1-3 ug/1000 m^3.

02. INTRODUCTION

As requested by the Northeastern Region, the Monitoring and Instrumentation Development Unit of the Air Resources Branch conducted an ambient air monitoring survey in the city of Sault Ste. Marie during July, 1978. The steel mill which is owned and operated by Algoma Steel Corporation Limited was the sole ambient air pollution source of interest during the survey period.

Gaseous pollutants monitored were sulphur dioxide (SO_2), total reduced sulphur (TRS), oxides of nitrogen (NO_x), ozone (0_3) and hydrocarbons (methane and non-methane components). Ground-level concentrations of the gaseous pollutants were determined by instrumentation housed in a mobile air monitoring (MAM) vehicle.

Samples of airborne particulate matter were gathered throughout the survey period by high-volume sampling devices in the vicinity of the steel mill. The samples were analyzed for total suspended particulate (TSP), total carbon, free carbon, sulphates, iron, manganese, polycyclic aromatic hydrocarbons (PAH) and silica.

03. SOURCE DESCRIPTION

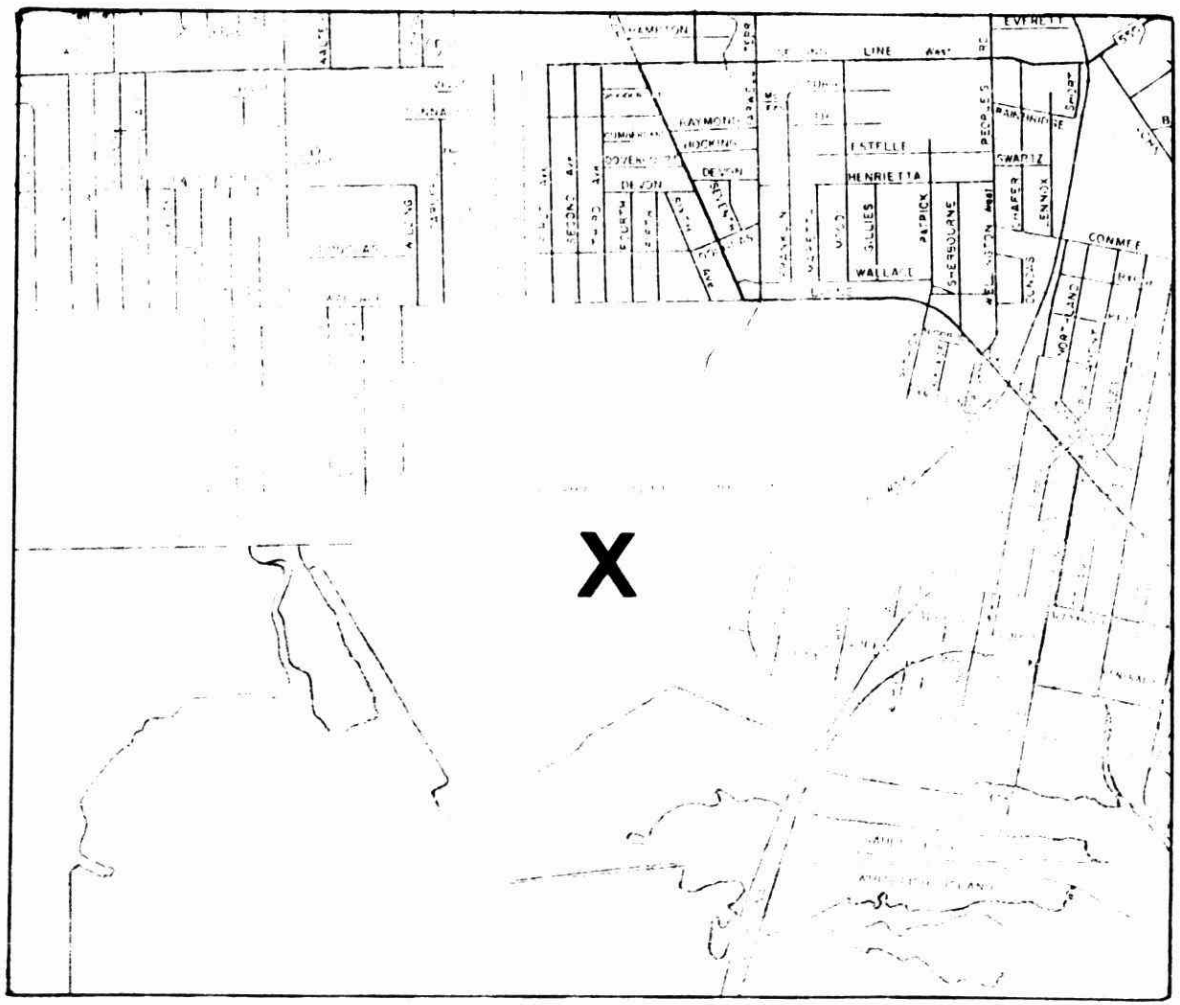
The Algoma Steel Corporation Limited steel mill is a completely integrated mill located in the western section of Sault. Ste. Marie on the north shore of the St. Marys River. The mill complex includes coke ovens, blast furnaces, a sinter plant, steel-making plants, rolling mills, a cold mill and material handling facilities in a 3 square kilometer area. A total of approximately 10 million net tons of coke, iron and raw steel were produced by the steel mill in 1978.

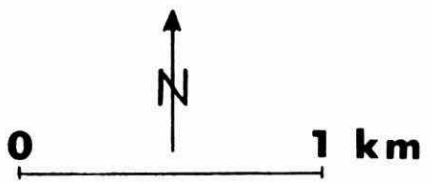
The terrain in the immediate vicinity of the mill is relatively flat and has no large effect on the dispersion or channeling of pollutants. However, the mill is only 25 kilometers from the southeastern shore of Lake Superior, and the resulting "lake breeze" effect tends to create a prevailing northwesterly wind direction.

All monitoring sites were referenced to the approximate center of the mill complex, UTM - coordinates (07019-51551). See Map #1 on page 6.

ALGOMA STEEL CORPORATION LIMITED

SAULT STE. MARIE, ONTARIO
UTM COORDINATES (07019-51551).





MAP #1

04. MONITORING TECHNIQUE

Instrumentation:-

Instrumentation housed in a 1975 General Motors Corporation Transmode was utilized to monitor the gaseous emissions from the Algoma Steel Corporation Limited steel mill. This unit is equipped with an automated data acquisition system (Hewlett - Packard 9830A mini-computer) and 2 on-board gasoline motor electric generators for fully automated, independent and continuous monitoring capabilities. The HP 9830A mini-computer performed preliminary data analyses in the field to ensure accuracy and validity; however, the final data reduction and analyses were carried out by a larger computer system located with the Air Resources Branch at 880 Bay Street, Toronto.

This mobile air monitoring (MAM) unit has permanently installed analyzers for monitoring sulphur dioxide, hydrogen sulphide, oxides of nitrogen, total hydrocarbons, methane, ozone and carbon monoxide. Meteorological instruments for monitoring wind speed, wind direction, relative humidity, temperature, barometric pressure and solar radiation are also included to form the complete instrumentation package. See Table 1, page 8 for listing of the above.

Sample Collection -

Continuous ambient air samples were taken at a constant flow rate (approximately 200 liters min^{-1}) by a probe located on top of the MAM unit. The air sample entered a manifold to which each analyzer was separately connected with a minimal length of teflon sampling line. This arrangement ensured little or no sample degradation and minimal delay time.

TABLE 1

INSTRUMENTATION - GMC TRANSMODE

a) Continuous Analyzers and Calibration Sources:

Instrument	Manufacturer	Analytical Principle	Maximum Sensitivity (Full Scale)
H_2S Source	Hartmann & Braun (H&B Prüfgasgenerator)	-	-
H_2S Analyzer	H & B Picos	electrochemical	0.05 ppm
SO_2 Source	H&B Prüfgasgenerator	-	-
SO_2 Analyzer	H & B Picoflux 2	conductometric	0.3 ppm
O_3 Analyzer/Source	Bendix 8002	chemiluminescent	0.05 ppm
NO_x, NO_2, NO Analyzer	Bendix 8101-B	chemiluminescent	0.5 ppm
NO_2 Source & Converter	H&B Prüfgasgenerator	-	-
THC, CH_4, THC-CH_4 Analyzer	Ingenieur - Produktions-Gruppe München (IPM) RS-5	Dual flame ionization detector	50 ppm THC (as CH_4)
THC, THC-CH_4 CH_4 Source	Matheson	compressed gas	-

b) Meteorological Instrumentation:

Instrument	Manufacturer	Scale
Wind Speed*	Lambrecht gmBH	km/hr
Wind Direction*	Lambrecht gmBH	degrees
Temperature	Weather Measure (WM) T621	C
Relative Humidity	WM-HM-IIIP	percentage
Barometric Pressure	WM-BM70-B242	millibars
Solar Radiation	WM-Star Pyranometer	watts/cm^2

* These wind indicators are located on top of a 10 metre retractable mast.

The MAM unit was always oriented during sampling periods in such a manner that the existing winds carried the emissions from the generator motors' exhausts away from the sampling probe inlet. The vehicle engine was always shut off during sampling periods.

Collection of (airborne) suspended particulate matter was accomplished with high-volume air sampling techniques. The high-volume sampler is a device employing the vacuum cleaner principle to pull ambient air continuously, generally for 24 hours, through either a glass fibre or Delbag Microsorban filter, depending upon the pollutants of interest. A flow controller was used to maintain the ambient air volume sampling rate at 1.13 $m^3 min^{-1}$.

Meteorological Data -

Local meteorological conditions were monitored continuously by the instrumentation contained in the MAM unit and listed in Table Ib. Additional meteorological information (e.g., large scale air mass movements) was obtained from the Atmospheric Environment Service of Canada.

Calibration -

The analyzers and calibration sources were calibrated before the survey. During the survey, the analyzer calibrations were checked at least once every day using the calibration sources and built-in electronic circuitry. The calibrations varied less than 5% throughout the duration of the survey.

05. SURVEY TECHNIQUE

The gas analyzers employed in this survey were subject to a warm-up period and calibration each morning during the survey. After waiting approximately ½ hour for the residual analyzer response to calibration to disappear, the MAM unit was ready to measure pollutant levels in the ambient air.

The approximate locations of the points of impingement zones were determined by communication with observers in 2 other motor vehicles. The visible plume was usually easy to locate and ambient air monitoring was initiated on those occasions when the impingement zone was accessible by the MAM unit. Air quality was continuously monitored for at least 45 minutes at each location and, whenever possible, monitoring was undertaken farther downwind as well.

Nine standard high-volume samplers were used to collect 24-hour samples of suspended particulate matter. The samplers were located at various distances and directions from the source investigated (see Table 3, page 16). Glass fiber filters were used as the collection media on six of the samplers and were analyzed later for TSP, total carbon, free (elemental) carbon, PAH, sulphates, iron and manganese. Delbag Microsorban filters were used on the other three samplers and they were analyzed later for silica content.

06. MONITORING SITE LOCATIONS

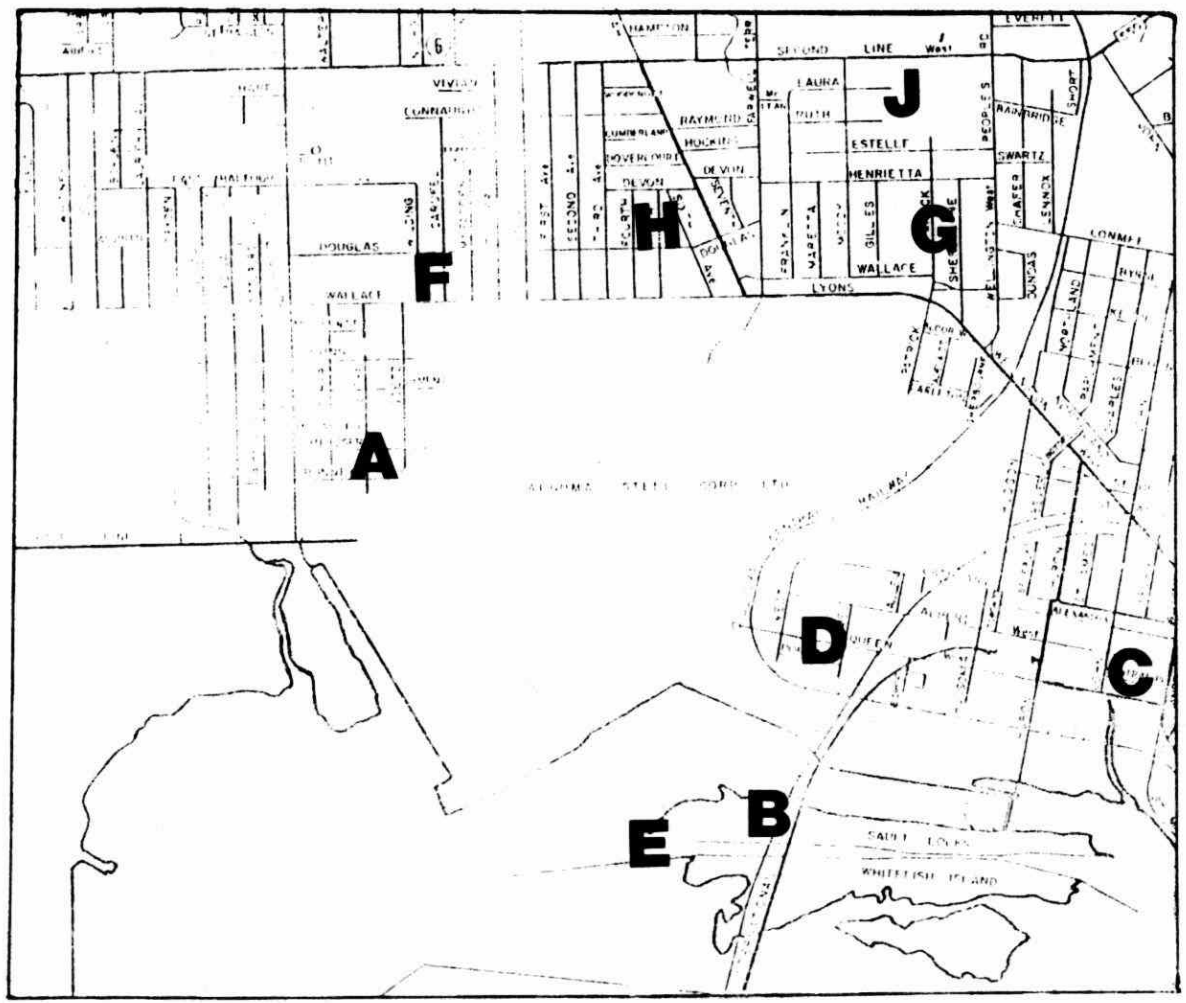
The approximate locations of the ambient air monitoring sites are shown on Map #2 (page 12) and their associated descriptions are presented in Table 2 (page 13) in chronological order.

The high-volume sampling sites are shown on Map #3 (page 15) and Table 3 (page 16) contains the complete descriptions of those sites.

SAULT STE. MARIE

AMBIENT AIR POLLUTION SURVEY - 1978

MONITORING SITES



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MAP #2

TABLE 2

Mobile Air Monitoring Sites
Sault Ste. Marie - 1978

Monitoring Period	Date 1978	Sampling Site	Location UTM Co-ordinates**	Distance* KM	Bearing* DGS
1	July 17	A	Bonney St., 0.3 km E. of Goulais (07011-51554)	0.9	300
5	July 20	B	Sault Lock (07025-51543)	0.7	140
6	July 20	C	Central Park (07038-51548)	1.2	100
8	July 20	D	Portage Lane & James St. (07028-51548)	0.9	100
10	July 20	E	West Tip Sault Locks (07022-51542)	0.8	170
11	July 21	F	Wallace Terrace Rd. & Wilding Ave.(07014-51561)	1.1	325
12	July 21	F	Wallace Terrace Rd. & Wilding Ave. (07014-51561)	1.1	325
13	July 21	G	Merrifield P.S. (07029-51563)	1.6	035
14	July 21	B	North Shore Sault Locks (07024-51544)	0.7	140
15	July 21	B	North Shore Sault Locks (07024-51544)	0.7	140
16	July 22	E	Whitefish Island Point (07024-51544)	0.7	160
17	July 23	E	Whitefish Island Point (07024-51544)	0.7	160
18	July 24	G	Merrifield P.S. (07029-51563)	1.6	035
19	July 24	H	David Kyle P.S. (07020-51564)	1.3	005
20	July 25	H	David Kyle P.S. (07020-51564)	1.3	005

TABLE 2 (Con't)

Survey No.	Date 1978	Sampling Site	Location UTM Co-ordinates	Distance* KM	Bearing* DGS
21	July 25	H	David Kyle P.S. (07020-51564)	1.3	005
22	July 26	J	J. Irving Children's Centre (07028-51567)	2.0	030
23	July 26	D	Portage Lane & James St. (07028-51548)	0.9	100
24	July 26	E	Whitefish Island Point (07023-51544)	0.7	160
25	July 27	E	Whitefish Island Point (07023-51544)	0.7	160
26	July 27	E	Whitefish Island Point (07023-51544)	0.7	160
27	July 27	E	Whitefish Island Point (07023-51544)	0.7	160

* Distance and bearing from the approximate centre of the steel mill complex.

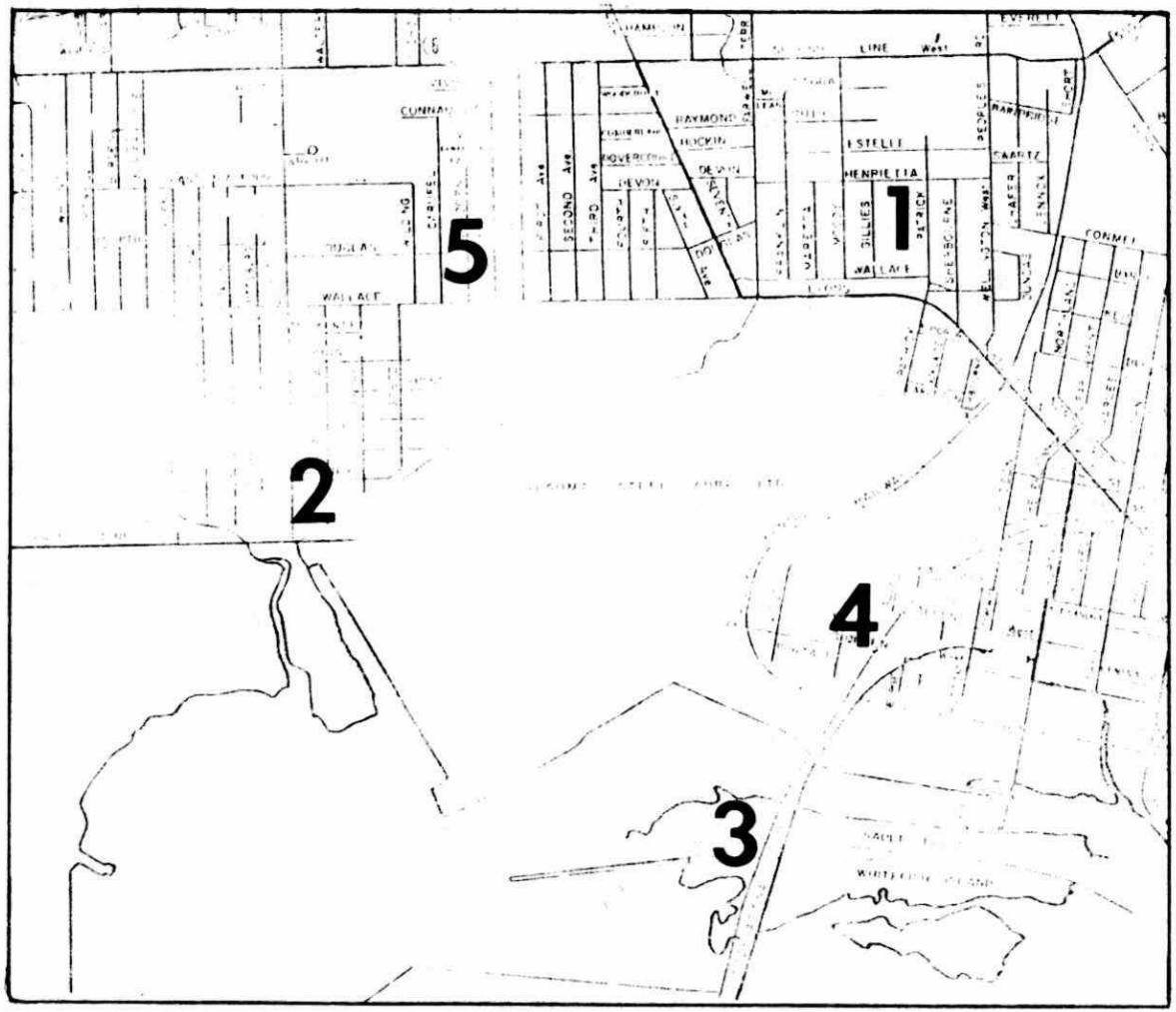
** Taken from maps identified as:

SERIES A851

MAPS 41 K/9C
41 K/9d

EDITION 2 MCE

SAULT STE. MARIE
AMBIENT AIR POLLUTION SURVEY - 1978
HIGH-VOLUME SAMPLING SITES



MAP #3

TABLE 3

HIGH-VOLUME SAMPLERS - SITE DESCRIPTIONS

Site	Filter Type	Site Description	Distance and Direction from Steel Mill
1	glass fibre, Delbag Microsorban	Merrifield School roof (07029-51564)	1.6 km & 040 degrees
2	glass fibre	Bonney St. pumphouse field area (07009-51554)	1.1 km & 290 degrees
3	glass fibre, Delbag Microsorban	Sault Locks; north-west side of Whitefish Island. grassy area (07025-51543)	0.9 km & 140 degrees
4	glass fibre	Sault College roof (07029-51550)	0.9 km & 095 degrees
5	glass fibre Delbag Microsorban	540 Douglas St. lawn area (07025-51562)	1.3 km & 340 degrees
6	glass fibre	Registry building, Queen St. East roof (07047-51542)	2.8 km & 115 degrees

07. RESULTS

All values for the gaseous pollutants are based on cumulative averages of continual instantaneous interrogations of the analytical instruments, and all results are expressed in parts per million (ppm). Sulphur dioxide was the gaseous pollutant of primary interest; however, all of the instruments in Table 1 were operational during most of the monitoring periods.

A statistical summary of the collected data is presented in Tables 4-7, pages 18-21. Supplementing these tables, plots of concentration versus time for SO_2, H_2S, O_3, NO_x, THC and the non-methane component of THC are presented in Figures 1 to 20, pages 49 to 68.

Omissions from the processed data were made as noted by the number scheme for the monitoring periods. The omissions resulted from the following:

(i) insufficient data - 45 minutes was deemed the minimum sampling period in order to establish a "true" 30-minute average concentration of the gaseous pollutant of interest.

(ii) instrument failure: mainly data acquisition and data handling problems (cassette tape damage); also, the catalytic oxidizer, which provided "zero air" for calibrating the NO_x,CO and hydrocarbon analyzers and provided clean air for use as fuel to burn the H_2 in the hydrocarbon analyzer, malfunctioned on July 22 and repairs were not completed before the survey was terminated.

iii) calibration effects: some monitoring periods included the residual instrument response to recently performed calibration.

Results of the high-volume sample analyses are presented in TABLES 8-12g. Air pollutant concentrations are known to follow a lognormal distribution, hence the use of geometric means.

TABLE # 4 Contaminant Levels in S.S. Marie Units - ppm

Monitoring Period	Date 1978 July	Monitored Period	Instantaneous Concentration				Maximum 1/2 Hour Average Concentration		Sample Period Mean Concentration		Scan Time
			SO_2		TRS						
			Min.	Max.	Min.	Max.	SO_2	TRS	SO_2	TRS	(min.)
S.S. Marie #1	17	23:54 - 09:24	0.012	0.058	0.001	0.034	0.042	0.015	0.022	0.005	1
S.S. Marie #5	20	10:24 - 12:34	0.043	0.210	0.004	0.036	0.150	0.020	0.097	0.010	1
S.S. Marie #6	20	13:10 - 14:10	0.012	0.031	0.001	0.002	0.020	0.001	0.018	0.001	1
S.S. Marie #8	20	16:07 - 18:17	0.007	0.052	0.001	0.013	0.025	0.008	0.016	0.005	1
S.S. Marie #10	20	23:10 - 09:25	0.001	0.021	0.001	0.008	0.017	0.005	0.006	0.002	2.5
S.S. Marie #11	21	11:00 - 12:00	0.014	0.027	0.005	0.008	0.021	0.007	0.020	0.006	1
S.S. Marie #12	21	12:15 - 13:45	0.012	0.050	0.007	0.012	0.037	0.010	0.027	0.009	1
S.S. Marie #13	21	14:31 - 15:31	0.004	0.012	0.005	0.006	0.010	0.006	0.008	0.005	1
S.S. Marie #14	21	16:04 - 19:19	0.001	0.175	0.004	0.024	0.085	0.011	0.052	0.007	1
S.S. Marie #15	21	19:26 - 01:41	0.011	0.137	0.002	0.032	0.110	0.013	0.003	0.006	1
S.S. Marie #16	22	10:11 - 15:41	0.001	0.499	0.002	0.006	0.025	0.004	0.006	0.003	1.5

TABLE # 5 Contaminant Levels in S.S. Marie Units - ppm

Monitoring Period	Date 1978 July	Monitored Period	Instantaneous Concentration				Maximum 1/2 Hour Average Concentration		Sample Period Mean Concentration		Scan Time
			SO_2		TRS						
			Min.	Max.	Min.	Max.	SO_2	TRS	SO_2	TRS	(min.
S.S. Marie #17	23	15:07 - 09:37	0.012	0.216	0.001	0.048	0.160	0.032	0.048	0.004	1
S.S. Marie #18	24	12:23 - 10:38	0.003	0.076	0.001	0.013	0.036	0.008	0.011	0.001	1
S.S. Marie #19	24	20:32 - 12:17	0.001	0.097	0.001	0.033	0.061	0.024	0.010	0.004	1
S.S. Marie #20	25	12:47 - 16:17	0.017	0.183	0.006	0.043	0.130	0.027	0.086	0.020	1
S.S. Marie #21	25	17:09 - 09:24	0.001	0.155	0.001	0.084	0.120	0.042	0.019	0.039	1
S.S. Marie #22	26	12:21 - 13:01	0.001	0.012	0.005	0.036	0.003	0.019	0.002	0.015	1
S.S. Marie #23	26	13:32 - 20:02	0.001	0.170	0.001	0.010	0.078	0.003	0.015	0.001	1
S.S. Marie #24	26	20:39 - 12:39	0.007	0.117	0.001	0.159	0.096	0.047	0.028	0.006	1
S.S. Marie #25	27	12:51 - 15:21	0.080	0.176	0.001	0.066	0.140	0.027	0.114	0.0161	1
S.S. Marie #26	27	16:07 - 17:27	0.060	0.133	0.013	0.089	0.100	0.043	0.089	0.035	1
S.S. Marie #27	27	17:45 - 22:15	0.071	0.305	0.019	0.528	0.260	0.220	0.160	0.088	1

TABLE # 6 Contaminant Levels in S.S. Marie Units - ppm

Monitoring Period	Date 1978 July	Monitored Period	Instantaneous Concentration				Maximum 1/2 Hour Average Concentration		Sample Period Mean Concentration		Scan Time
			O_3		NO_x						
			Min.	Max.	Min.	Max.	O_3	NO_x	O_3	NO_x	(min.
S.S. Marie #1	17	23:54 - 09:24	0.001	0.026	0.023	0.412	0.023	0.120	0.0143	0.066	1
S.S. Marie #5	20	10:24 - 12:34	0.005	0.018	0.024	0.102	0.011	0.071	0.010	0.062	1
S.S. Marie #6	20	13:10 - 14:10	0.014	0.024	0.020	0.114	0.020	0.039	0.020	0.038	1
S.S. Marie #8	20	16:07 - 18:17	0.013	0.028	0.012	0.095	0.024	0.041	0.023	0.029	1
S.S. Marie #10	20	23:10 - 09:25	0.001	0.016	-	-	0.013	-	0.006	-	2.5
S.S. Marie #11	21	11:00 - 12:00	0.011	0.024	0.037	0.187	0.019	0.085	0.017	0.084	1
S.S. Marie #12	21	12:15 - 13:45	0.008	0.030	0.033	0.316	0.025	0.140	0.020	0.095	1
S.S. Marie #13	21	14:31 - 15:31	0.025	0.044	0.014	0.067	0.036	0.023	0.031	0.020	1
S.S. Marie #14	21	16:04 - 19:10	0.001	0.035	0.019	0.118	0.027	0.084	0.012	0.058	1
S.S. Marie #15	21	19:26 - 01:41	0.001	0.027	-	-	0.021	-	0.015	-	1
S.S. Marie #16	22	10:11 - 15:41	0.002	0.030	0.014	0.181	0.027	0.079	0.023	0.040	1.5

TABLE # 7 Contaminant Levels in S.S. Marie Units - ppm

Monitoring Period	Date 1978 July	Monitored Period	Instantaneous Concentration				Maximum 1/2 Hour Average Concentration		Sample Period Mean Concentration		Scan Time
			O_3		NO_x						
			Min.	Max.	Min.	Max.	O_3	NO_x	O_3	NO_x	(min.)
S.S. Marie #17	23	15:07 - 09:37	0.001	0.024	-	-	0.019	-	0.007	-	1
S.S. Marie #18	24	12:23 - 19:38	0.015	0.040	-	-	0.036	-	0.033	-	1
S.S. Marie #19	24	20:32 - 12:17	0.001	0.058	-	-	0.051	-	0.020	-	1
S.S. Marie #20	25	12:47 - 16:17	0.011	0.087	-	-	0.067	-	0.045	-	1
S.S. Marie #21	25	17:09 - 09:24	0.001	0.084	-	-	0.075	-	0.039	-	1
S.S. Marie #22	26	12:21 - 13:01	0.007	0.050	-	-	0.042	-	0.039	-	1
S.S. Marie #23	26	13:32 - 20:02	0.005	0.059	-	-	0.054	-	0.040	-	1
S.S. Marie #24	26	20:39 - 12:39	0.001	0.035	-	-	0.032	-	0.017	-	1
S.S. Marie #25	27	12:51 - 15:21	0.007	0.170	-	-	0.150	-	0.081	-	1
S.S. Marie #26	27	16:07 - 17:27	0.004	0.013	-	-	0.009	-	0.008	-	1
S.S. Marie #27	27	17:45 - 22:15	0.001	0.011	-	-	0.009	-	0.006	-	1

TABLE 8

HIGH-VOLUME RESULTS: (ug/m^3)

Date 1978 July	Merrifield School			Bonney Street			Sault Locks			Sault College			540 Douglas Street			Registry Office			Wind	
	TSP	Mn	Fe_2O_3	TSP	Mn	Fe_2O_3	TSP	Mn	Fe_2O_3	TSP	Mn	Fe_2O_3	TSP	Mn	Fe_2O_3	TSP	Mn	Fe_2O_3	Sp km/hr	Di
17	65	0.31	11.5							69	0.22	5.2	62	0.23	7.6				8	67°
18	141	0.21	5.8	198	1.09	19.5				122	0.93	20.6	131	0.39	9.5				10	210°
19	84	0.12	3.9	213	2.09	23.1	63	0.17	7.6	112	1.20	30.7	97	0.28	8.1				3	170°
20	47	0.16	4.5	187	1.44	14.8	53	0.33	17.3	134	0.88	29.4	49	0.22	4.4	131	0.21	2.3	10	305°
21	56	0.30	6.9	178	0.60	4.6	79	0.30	13.7	130	0.43	20.9	73	0.41	8.4				8	285°
22	55	0.06	3.3	65	0.63	21.4	59	0.29	17.7	86	0.62	26.1	41	0.20	3.0				11	260°
23	46	0.41	13.2	140	4.47	99.8	64	0.00	1.7	111	0.23	3.9	57	0.10	2.8				9	315°
24	93	0.74	25.9	505	2.73	39.3	43	0.00	2.5	77	0.13	3.1	140	0.81	25.4				6	180°
25	185	0.27	8.6	450	1.26	11.7	60	1.07	45.3	144	0.21	6.4	267	0.91	18.1				7	230°
26	77	0.21	8.4	127	0.15	4.4	155	0.56	24.2	324	0.20	8.1	66	0.26	3.2				15	285°
27	59	0.98	13.7				91	0.10	3.9				51	0.27	4.7				25	315°
eom. Mean	75	0.26	8.0	193	1.12	17.2	69	0.19	9.4	119	0.38	11.2	80	0.31	6.7	131	0.21	2.3		
t. Geom. Dev.	1.57	2.08	1.82	1.79	2.34	2.54	1.46	2.70	2.60	1.55	2.10	2.22	1.78	1.83	2.04					

TABLE 9

HIGH-VOLUME RESULTS: TOTAL CARBON, FREE CARBON (ug/m^3)

DATE	LOCATION													
	540 Douglas Street		Merrifield School		Sault College		Bonney St.		Sault Locks		Registry Office		Wind	
1978 July	Total C	Free C	Total C	Free C	Total C	Free C	Total C	Free C	Total C	Free C	Total C	Free C	Sp km/hr	Di
17	36.3	28.7	27.3	17.1	30.4	24.0	-	-	-	-			8	67°
18	38.6	17.9	45.3	23.5	41.7	23.8	71.1	19.7	-	-			10	210°
19	33.8	22.0	28.2	18.0	56.9	37.1	95.2	50.2	26.5	17.9			3	170°
20	22.8	16.2	26.8	22.6	65.9	31.9	63.8	36.9	29.3	28.4	64.8	49.8	10	305°
21	33.5	15.8	24.0	23.1	53.5	28.7	89.9	35.0	32.5	25.6			8	285°
22	29.2	22.6	40.1	32.5	38.3	27.9	34.4	29.9	37.7	32.2			11	260°
23	22.8	16.8	21.0	12.1	48.1	28.7	44.7	34.9	21.5	11.3			9	315°
24	41.3	28.3	30.0	23.8	28.2	23.1	144.3	77.5	16.7	15.2			6	180°
25	65.0	22.9	42.8	31.6	43.7	30.1	203.6	131.4	17.1	7.45			7	230°
26	25.3	13.8	29.5	24.6	86.4	21.4	44.4	40.1	48.7	11.0			15	285°
27	23.2	19.8	23.5	18.3	-	-	-	-	34.4	27.1			25	315°
Geom. Mean	32.1	19.9	29.8	21.7	46.8	27.3	75.3	43.4	27.8	17.6				
St. Geom. Dev.	1.38	1.25	1.29	1.31	1.38	1.19	1.74	1.74	1.40	1.59				
Approx. background conc.	29	19	26	19	41	26	58	33	20	13				
Approx. Algoma Steel contrib.	16	9	15	13	24	6	90	45	16	15				

TABLE 10

HIGH-VOLUME RESULTS: TOTAL CARBON/TSP (%)

FREE CARBON/TSP (%)

DATE	LOCATION											
	540 Douglas St.		Merrifield School		Sault College		Bonney Street		Sault Locks		Registry	
1978	Total	Free	Total	Free	Total	Free	Total	Free	Total	Free	Total	Free
July 17	58	46	42	26	44	35	-	-	-	-	-	-
July 18	29	14	32	17	34	20	36	10	-	-	-	-
July 19	35	23	33	21	51	33	45	24	42	28	-	-
July 20	46	33	57	48	49	24	34	20	55	53	50	38
July 21	46	22	43	41	41	22	50	20	41	32	-	-
July 22	71	55	73	59	45	32	53	46	64	55	-	-
July 23	40	29	46	26	43	26	32	25	34	18	-	-
July 24	30	20	32	26	37	30	29	15	39	35	-	-
July 25	24	9	23	17	30	21	45	29	29	12	-	-
July 26	38	21	38	32	27	7	35	32	31	7	-	-
July 27	45	39	40	31	-	-	-	-	38	30	-	-
Geometric Mean	40.1	25.1	40.0	29.0	39.3	23.2	39.1	22.6	40.2	25.2	-	-

TABLE 11

HIGH-VOLUME RESULTS: $SO_4^=$, SiO_2 (ug/m^3)

Date 1978 July	540 Douglas St. #5		Merrifield School #1		Sault Locks #3		Sault College #4	Bonney St. Pumphouse #2	Registry Office #6	Wind	
	$SO_4^=$	SiO_2	$SO_4^=$	SiO_2	$SO_4^=$	SiO_2	$SO_4^=$	$SO_4^=$	$SO_4^=$	SP km/hr	Di
17	9.5	8.0	9.9	8.8	-	-	8.7	-	-	8	67°
18	38.1	6.5	47.3	10.3	-	-	45.3	49.4		10	210°
19	25.0	7.3	21.8	7.3	17.4	5.1	23.3	30.8		3	170°
20	11.0	5.8	11.8	5.8	19.9	5.1	18.0	14.1	14.3	10	305°
21	11.2	5.8	11.0	6.4	11.8	8.5	12.2	12.3		8	285°
22	12.1	2.9	12.1	3.7	14.5	5.2	14.0	10.7		11	260°
23	10.6	3.6	10.3	4.4	13.2	5.7	10.9	11.9		9	315°
24	18.3	8.7	13.3	12.4	10.8	16.1	13.5	25.2		6	180°
25	43.8	26.2	40.3	15.3	19.1	13.7	39.6	41.4		7	230°
26	11.6	8.1	13.5	9.6	20.5	11.8	26.2	12.3		15	285°
27	7.1	13.8	7.8	10.9	18.3	9.9	-	-		25	315°
Geom. Mean	15.1	7.4	15.1	7.9	15.8	8.2	18.3	19.6			
St. Geom. Dev.	1.80	1.82	1.83	1.49	1.26	1.53	1.71	1.39			

TABLE 12a PAH (Geometric means ug/1000m^3)

Location (distance to Steel Mill (km))	Fluoranthene	Perylene	BkF	BaP	B(ghi)P
540 Douglas St. (1.3 km)	0.261	0.362	0.209	0.204	0.954
Merrifield School (1.6 km)	0.525	0.457	0.270	0.357	1.182
Sault College (0.9 km)	1.314	1.851	1.181	1.298	3.199
Bonney St. (1.1 km)	1.184	1.776	1.052	1.007	2.222
Sault Locks (0.9 km)	0.662	1.082	0.669	0.520	2.096

TABLE 12b PAH

Location: 540 Douglas St.

Filter Number	Date	ug/1000m^3					Wind	
		Fluoranthene	Perylene	BkF	BaP	B(ghi)P	Sp km/hr	Di
	July							
600167	17	0.15	0.11	0.06	0.08	0.32	8	67°
600171	18	0.26	0.54	0.30	0.37	1.05	10	210°
600176	19	0.16	0.27	0.19	0.15	0.84	3	170°
600183	20	0.15	0.17	0.11	0.29	0.65	10	305°
600189	21	0.23	0.22	0.13	0.30	0.66	8	285°
600195	22	0.18	0.12	0.06	0.06	0.38	11	260°
600201	23	0.20	0.32	0.17	0.18	1.14	9	315°
600207	24	0.70	3.14	1.87	1.11	5.58	6	180°
600213	25	0.97	2.37	1.30	0.83	3.52	7	230°
600218	26	0.24	0.18	0.11	0.06	0.43	15	285°
600223	27	0.30	0.46	0.25	0.11	1.34	25	315°
Geometric Mean		0.26	0.36	0.21	0.20	0.95		

TABLE 12c PAH

Location: Merrifield Public School

Filter Number	Date	µg/1000m³					Wind	
		Fluoranthene	Perylene	BkF	BaP	B(ghi)P	Sp km/hr	Di
	July							
600168	17	0.21	0.13	0.08	0.14	0.45	8	67°
600173	18	0.49	1.15	0.66	1.09	2.23	10	210°
600178	19	1.00	0.65	0.45	0.75	1.10	3	170°
600185	20	0.62	0.32	0.21	0.44	0.97	10	305°
600191	21	0.32	0.27	0.19	0.32	0.48	8	285°
600197	22	0.53	0.42	0.22	0.30	1.31	11	260°
600203	23	0.40	0.24	0.14	0.17	0.97	9	315°
600209	24	1.22	0.70	0.41	0.49	1.67	6	180°
600215	25	0.74	1.01	0.53	0.56	1.67	7	230°
600220	26	0.43	0.37	0.20	0.17	1.09	15	285°
600225	27	0.50	0.83	0.44	0.31	3.18	25	315°
Geometric Mean		0.52	0.46	0.27	0. 36	1.18		

TABLE 12d PAH

Location: Sault College

Filter Number	Date	ug/1000m^3					Wind	
		Fluoranthene	Perylene	BkF	BaP	B(ghi)P	Sp km/hr	Di
	July							
600169	17	0.46	0.18	0.12	0.20	0.47	8	67°
600174	18	0.59	0.39	0.27	0.28	0.44	10	210°
600179	19	3.65	7.15	4.27	10.4	9.89	3	170°
600186	20	9.25	26.5	16.2	29.9	27.3	10	305°
600192	21	0.71	2.02	1.56	1.09	3.25	8	285°
600198	22	0.70	1.83	1.05	0.60	4.38	11	260°
600204	23	0.72	1.98	1.08	1.20	4.68	9	315°
600210	24	0.53	0.28	0.22	0.08	0.77	6	180°
600216	25	1.04	0.78	0.46	0.56	1.28	7	230°
600221	26	8.50	22.2	13.1	22.2	30.6	15	285°
Geometric Mean		1.31	1.85	1.18	1.30	3.20		

TABLE 12e PAH

Location: Bonney St.

Filter Number	Date	ug/1000m^3					Wind	
		Fluoranthene	Perylene	BkF	BaP	B(ghi)P	SP km/hr	Di
	July							
600172	18	0.62	0.97	0.57	0.72	1.25	10	210°
600177	19	1.38	4.13	2.55	2.29	4.75	3	170°
600184	20	1.13	1.55	0.98	1.39	2.28	10	305°
600190	21	1.74	1.56	0.97	1.22	1.90	8	285°
600196	22	0.55	0.59	0.37	0.19	0.61	11	260°
600202	23	0.95	2.24	1.22	2.01	4.49	9	315°
600208	24	2.86	7.99	4.53	2.95	7.74	6	180°
600214	25	2.52	2.46	1.40	0.97	2.24	7	230°
600219	26	0.72	0.70	0.40	0.35	1.08	15	285°
Geometric Mean		1.18	1.78	1.05	1.01	2.22		

TABLE 12f PAH

Location: Sault Locks

Filter Number	Date	ug/1000m^3					Wind	
		Fluoranthene	Perylene	BkF	BaP	B(ghi)P	Sp km/hr	Di
	July							
600180	19	0.54	1.09	0.66	0.99	1.92	3	170^o
600187	20	1.34	3.06	2.02	3.70	5.62	10	305^o
600193	21	0.51	0.73	0.46	0.38	1.70	8	285^o
600199	22	0.34	1.80	1.40	0.94	7.02	11	260^o
600205	23	0.34	0.57	0.33	0.29	1.73	9	315^o
600211	24	0.23	0.12	0.09	0.05	0.22	6	180^o
600217	25	0.25	0.16	0.09	0.06	0.13	7	230^o
600222	26	8.53	5.59	3.03	1.71	11.9	15	285^o
600227	27	1.17	7.56	3.88	1.44	10.3	25	315^o
Geometric Mean		0.66	1.08	0.67	0.52	2.10		

TABLE 12g PAH

Location: Registry Office

Filter Number	Date	µg/1000m^3				
		Fluoranthene	Perylene	BkF	BaP	B(ghi)P
	July					
600182	19	Invalid				
600188	20	6.00	8.23	4.97	11.1	12.9
600200	22	Invalid				
600206	23	Invalid				
Mean		6.00	8.23	4.97	11.1	12.9

08. DISCUSSION:

Ambient air monitoring of ground-level concentrations (GLC) of gaseous pollutants was carried out by the MAM unit in the vicinity of Sault Ste. Marie during the period July 17th - 29th, 1978. The meteorological conditions for July produced a mean temperature 1 C^{o} below the 30-year mean for July, and precipitation was more than 50% above normal amounts. Five frontal systems moved through the area during the survey period. The main July storm track led from Alberta eastward, passing between Lake Superior and Lake Huron on the south and southern Hudson Bay on the north; this resulted in the northwesterly winds being the strongest during the survey period, a condition which was probably abetted by the lake-breeze effect.

A condition existed during the survey period which significantly simplified the processes of monitoring and data evaluation. The Abitibi Paper Company Limited mill located on the northern edge of the Sault Ship Canal, roughly 1 km south-east of the Algoma steel mill, was shut-down during the survey period, thereby eliminating a potential source of air pollutants.

An attempt was made to start each monitoring period in an impingement zone and continue recording data for as long as the impingement persisted or for 45 minutes, whatever period was greater. Approximately 135 hours of data were accumulated and analyzed for the 22 monitoring periods reported here.

The measurement parameter of greatest utility for this work is the maximum half-hour average concentration (MHAC) for each monitoring period. The MHAC represents an uninterrupted 30-minute interval within the monitoring period and can be directly compared to the Ontario Standards and Guidelines.

The following Standards based on a 30-minute average concentration of gaseous pollutants, at the point of impingement as set out in Schedule 1, Regulation 15 of the Ontario Environmental Protection Act, must be considered when the results of this survey are evaluated.

Pollutant	Standard*
SO_2	0.30 ppm
NO_x	0.27 ppm**
O_3	0.10 ppm

* Conversion from ug/m^3 to ppm was made under the following conditions: temperature = 298^oK, atmospheric pressure = 101.6 k Pa

** Expressed as concentrations of NO_2.

Also, the following Ontario Guideline for total reduced sulphur compounds is applicable because the H_2S analyzer used in the MAM unit is also sensitive to mercaptans, CH_3SH, and to compounds containing the HS^- group, such as dimethyl sulphide, $(CH_3)_2S$, and dimethyl disulphide, $(CH_3)_2S_2$.

Pollutant	Guideline (½ hour average)
TRS	0.027 ppm H_2S

It is highly probable that H_2S is the major component of the TRS compounds emitted from the Algoma Steel Corporation Limited mill. All results are expressed as concentrations of H_2S.

Sulphur Dioxide - SO_2:

Sulphur dioxide was monitored at 22 sites for a total of 135 hours. The Ontario Standard of 0.30 ppm was not exceeded at any time. The largest MHAC was 0.26 ppm during monitoring period #27 on Whitefish Island, which also produced the maximum instantaneous concentration of SO_2 (0.30 ppm) for the entire survey.

The mean MHAC for the 22 sampling periods was 0.08 ppm SO_2.

A windrose plot for period #27 (Figure 29) confirms that SO_2 was detected only when the wind was blowing from the Algoma Steel Corporation Limited mill towards the MAM unit.

Total Reduced Sulphur - TRS:

TRS was monitored at 22 sites for a total of 135 hours. The Ontario Guideline of 0.027 ppm H_2S was exceeded during 5 of the monitoring periods (#'s 17, 21, 24, 26, 27) for a total of approximately 12 hours. The largest MHAC of TRS for the survey was 0.22 ppm H_2S, detected during monitoring period #27; this period also contained the maximum instantaneous concentration of TRS for the survey, 0.528 ppm H_2S. The mean MHAC for the 22 monitoring periods was 0.027 ppm.

For every 30-minute interval during monitoring periods #26 and #27, the average concentration of TRS was greater than the Ontario Guideline; these periods covered the time interval from 16:10 to 22:15 on July 27th. During these periods the MAM unit was on Whitefish Island 0.7 kilometers

SSE of the mill site across open water, and winds were brisk from the NW in the range of 15-30 km/hr. Concentration/time plots for monitoring periods #'s 24,25,26 and 27 (pages 65-68) reveal that the brisk NW winds were established around 04:00 on July 27th with the passage of a cold front and persisted for approximately 18 hours. Note, however, that the Guideline for TRS was only exceeded during the final 6 hours of that period. This feature is probably an accurate representation of the pattern of the steel mill emissions since the wind conditions were very steady.

Windrose plots for monitoring periods #17 and #24 reveal that TRS was detected only when the wind was blowing from the direction of the steel mill towards the MAM unit.

Nitrogen Oxides - NO_x:

Oxides of nitrogen were monitored during 11 periods for a total of 43 hours. The Ontario Standard of 0.27 ppm for a 30-minute period was not exceeded at any time. The largest MHAC was 0.18 ppm during monitoring period #10, but the concentration/time plot for that period (page 53) shows that the wind was calm when the maximum concentration was detected, indicating that the MAM unit generators could have been the source of the NO_x.

Monitoring period #1 experienced a steady wind speed of 8 km/hr during the interval 23:54-09:24 on Bonney Street. There was, therefore, a minimum of NO_x emissions detected from the MAM unit generators and from vehicular traffic, so that an MHAC of 0.12 ppm NO_x during that period fairly

well represents the ambient levels due to the steel mill emissions at the time. The windrose plot for period #1 confirms that the NO_x was carried by winds blowing from the steel mill (towards the MAM unit):

The maximum instantaneous concentration of NO_x during the survey, with minimal contributions from vehicular traffic and the MAM unit generators, was 0.412 ppm during monitoring period #1.

Ozone - O_3:

Ozone was monitored as a matter of routine at 22 sites for a total of 135 hours. The mean MHAC for the 22 monitoring periods was 0.036 ppm

The Ontario Standard of 0.10 ppm was exceeded only during monitoring period #25 when an MHAC of 0.15 ppm was attained with a maximum instantaneous concentration of 0.17 ppm. The wind rose plot for that monitoring period (Figure 25) shows that the wind direction which provided the higher GLC's of O_3 coincided with the direction of the steel mill. Since the Algoma Steel Mill is not a known source of elevated O_3 emissions, however, a more likely source of O_3 during monitoring period #25 is long range transport from the southwest. During the 3-day period preceding 18:00 hours on July 27 (monitoring period #23) the air flow was from the south and southwest and could have transported O_3-laden air from the industrial area near the southern end of Lake Michigan to the region over Lake Superior; the ensuing north-west winds could then have delivered the higher concentrations of O_3 to the Sault Ste. Marie area.

HIGH-VOLUME ANALYSES - PARTICULATES:

Six High-Volume samplers were operated with glass fibre filters at six different locations to determine total suspended particulate (TSP) mass concentrations and the amount present in the form of carbon(C), manganese (Mn), iron (Fe), sulphates ($SO_4^=$) and polycyclic aromatic hydrocarbons (PAH). In addition, samplers were operated with Delbag Microsorban filters at three of those locations to determine the loadings of silica (SiO_2) in the ambient air.

The wind parameters quoted with the results are based on data recorded during the monitoring periods of the MAM unit. Thus, there were intervals during each 24-hour High-Volume sampling period when the wind parameters were unknown. Although it is felt that the values quoted are the best estimated average values for wind conditions over the 24-hour periods, some of the anomalies of the High-Volume data may be due to those unmonitored intervals when the wind conditions may have differed from the quoted average values.

i) Total Suspended Particulate (TSP):

The results in Table 8 show that 20 of the 51 samples were found to have TSP mass concentrations in excess of the Air Quality Criterion of 120 ug/m^3, based on a 24-hour sampling period. A concentration of 505 ug/m^3 at Bonney St. on July 24th was the maximum value for the survey.

Among the six sample locations the daily maximum TSP loading generally occurred at the pumphouse on Bonney St., which was sufficiently close to the Algoma Steel Mill that any wind direction with a bearing between 030 degrees and 240 degrees carried pollutants from some part of the mill complex.

Each location showed its maximum TSP loading when the average wind direction, as shown in the right-hand column, was approximately from the direction of the steel mill. (Refer also to MAP# 3 showing the high-volume sites).

ii) Iron(Fe):

The results for iron can be related to the 24-hour Ontario Air Quality Criterion of 25 ug/m^3 for ferric oxide (Fe_2O_3) at the point of impingement if the iron is known to exist mainly in the Fe_2O_3 form. This is considered to be a good approximation for steel mills.

Table 8 shows that 8 of the 51 samples were exposed to mass concentrations of iron greater than the Ontario Criterion. The maximum loading for the entire survey occurred at the Bonney St. location during the 24-hour period starting at 12:38 on July 23. A level of 99.8 ug/m^3 was obtained for that period. Several sources of wind information (Figures #10,11,12 and 22) show that the wind direction was N, NW and W for the first half of the period and later shifted to SE and SW. A slag heap approximately 2 km west of the Algoma steel mill site may have contributed significantly to the high concentration of iron at the Bonney St. location during the periods with westerly winds.

The three locations closest to the steel mill attained the three largest average loadings of iron. In addition, each high-volume location showed relative maxima of iron concentrations when the wind direction coincided with the direction of the steel mill. However, the maximum attained at the Sault Locks site for the period starting on July 25 (45.3 ug/m^3) occurred when the wind direction was S and SW, whereas the steel mill direction was NW. One possible reason for this anomaly is the existence of some gravel-surface roads and parking lots within 100 meters S and SW of the sampler location. The accumulated iron particulates on the gravel may have been agitated by the vehicular traffic and carried by the prevailing wind to the sampler location.

A background concentration of 2-3 ug/m^3 Fe_2O_3 for each of the sampler locations is indicated by a consideration of the upwind and downwind concentrations.

iii) Manganese(Mn):

The manganese results should be compared with the 24-hour Ontario Air Quality Criterion of 50 ug/m^3.

It can be seen in Table 8 that the mass concentrations of manganese were generally less than 1 ug/m^3 for all of the high-volume locations except the Bonney Street pumphouse. Six of the nine filters exposed at that location showed manganese levels greater than 1 ug/m^3. The maximum value of 4.47 ug/m^3 was obtained for the period starting on July 23, which coincides with the period of maximum iron concentration.

Analysis revealed a correlation coefficient of 0.88 between the manganese and iron concentration, which is highly significant for the 51 data points used and indicates a common source of Fe and Mn.

(iv) Carbon (C):

Table 9 lists the total amount of carbon and the amount present in the free carbon form (coal, coke, soot, graphite) for each of the exposed filters.

The relatively low values of the standard geometric deviation at each location suggest that there are several sources of carbon in the Sault Ste. Marie area; however, most of the larger carbon values at each location occurred when the winds were from the direction of the Algoma steel mill or its by-products plants and slag heap areas located west of the steel mill. The Bonney St. sampling site received emissions from the Algoma steel mill on July 19th and July 24th, but the largest concentrations at that site were from the direction of the slag heap and by-products plants on July 25th. It appears most likely that the relatively high background levels of total carbon and free carbon, which account for the low standard geometric deviations at all sampling sites, originate not from several distinct sources but from the accumulated deposits in all neighbourhoods due to the presence of the Algoma steel mill. The term "background" is used here to describe those concentrations of carbon not due directly to the emissions of carbon from the Algoma steel mill.

The approximate background concentrations in Table 9 are averages of the results during sampling periods upwind of the Algoma steel mill. By subtracting these values from the results during downwind sampling periods one can estimate the direct contributions of carbon from the steel mill complex, including the slag heap areas and plants west of the steel mill. To determine the separate contribution from each part of the steel mill complex would require a more extensive network of high-volume samplers.

The percentage of TSP in the form of total carbon was remarkably consistent at 40% for each of the sampling locations (Table 10). The free carbon percentage was slightly less consistent, lying in the range of 23% to 29%.

(v) Sulphates ($SO_4^=$):

Table 11 shows that the largest mass concentrations of $SO_4^=$ at most sampler locations (#'s 1, 2, 4, 5) occurred on the same days. The maxima were in the range of 40-50 ug/m^3 and the winds were generally southerly. The only deviation from the above results was seen at the sampler location on the Sault Locks, where the maximum for the survey period was only 20.5 ug/m^3. The simultaneous occurrence of maxima at the various sampler locations was probably due to long-range transport from the south, not the Algoma Steel Corporation Limited mill.

A relatively high background concentration of 10-12 ug/m^3 can be discerned by considering the concentrations upwind of the Algoma steel mill on July 17, 20-23, and 26.

Background refers herein to the $SO_4^=$ concentrations not directly attributable to either the Algoma steel mill emissions or long range transport from the south/southwest. The origin of the background may in fact be

either or both of the above-mentioned sources via some indirect transport mechanism to the sampling sites, but that is not determinable from such a limited survey as reported here. It is expected also that the background concentration should vary according to the loading potential of each passing air mass.

The $SO_4^=$ concentrations due to the Algoma steel mill emission can be determined by comparing the concentrations upwind and downwind of the steel mill on the same days. The results for July 20, 26 and 27 show that the steel mill emissions contributed 9-14 ug/m^3 directly to the ambient air at the downwind sampling locations.

An estimate of the $SO_4^=$ concentrations carried by long-range transport from the south and southwest can be made from the results on July 18th and 25th. The difference between the total concentration and the sum of the background and steel mill contributions produces a range of around 15-25 ug/m^3 for those days. July 19th and 24th each experienced southerly winds as well, but estimates of $SO_4^=$ from long-range transport are reduced to around 7ug/m^3 and 2 ug/m^3, respectively, for those dates due to the assumed presence of the background $SO_4^=$ component at all sites.

(vi) Silica (SiO_2):

The mass concentrations of silica were determined from analysis of the Delbag Microsorban filters exposed at Hi-Volume sites #'s 1,3 and 5. The results are presented in Table 11, which shows relatively low concentrations at each site until July 24th. Commencing on that date, a marked increase in the SiO_2 concentration which persisted for the survey duration was recorded at each site. Overall, the geometric mean value of SiO_2 differed little between sites, lying in the range of 7.4 to 8.2 ug/m^3.

Based on only 9-11 samples at each of the 3 sampling sites, the results for SiO_2 are not sufficiently clear-cut to permit a conclusive statement on emissions from the Algoma steel mill.

There is no Standard, Guideline or Criterion for SiO_2 since the upper limit for the size of the respirable component has not been determined. Results are presented here only for future reference.

(vii) Polycyclic Aromatic Hydrocarbons (PAH):

There is no Ontario Standard or Guideline for total PAH or for any of the following components: fluoranthene, perylene, benzo(k) fluoranthene (BkF), benzo(a)pyrene (BaP), and benzo(ghi) perylene (B(ghi)P).

Table 12a displays the geometric mean concentration of each PAH component at each high-volume sampling location. For each component the Sault College location received the highest mean concentration, the Bonney St. location received the 2nd highest, then the Sault Locks location, Merrifield School and 540 Douglas St., in that order. As Table 12a shows, distance from the center of the steel mill complex appears to be a factor in the results; the 3 closest locations have the 3 largest mean concentrations. However, the concentrations are not a linear function of distance since the Sault College and Sault Locks locations are equidistant from the mill center but their PAH concentrations differ by a factor of 2.

Contributions of PAH to the ambient air by the Algoma steel mill emissions are strongly indicated by the data in Tables 12b-12g when the wind directions are taken into account (Figure 30). Note that, although the Sault College, Bonney St., and Sault Locks locations are about equidistant from the steel mill center, the maximum concentrations at Sault College are greater by approximately a factor of 3.

A cursory comparison (due to small sample number) of the data with the results compiled by the Northeastern Region of the Ministry of the Environment in a sampling programme[1] carried out in 1975 shows general agreement for the BkF and BaP components of PAH. The geometric mean at the Bonney St. site was 28% less and 23% less in 1978 for BkF and BaP, respectively.

Some caution is advised when assessing the PAH results reported here since only a very small number (9 to 11) of high-volume samples were taken at each location. In addition, it is known that the different PAH compounds have decomposition rates which depend upon the amount of sunlight and oxidant (.e.g ozone) present [2]. For example, BaP decomposes by 50% every 0.62 hours (half-life) in the presence of sunlight and 0.19 ppm ozone. With sunlight and no ozone the half-life of BaP is 5.3 hours, which is still much less than the usual sample collection time of 24 hours. With neither sunlight nor ozone present, 1.8% of the BaP decomposes in 24 hours. In view of the above facts, it is evident that the PAH levelswere probably higher than reported here. No accurate determination of ambient air PAH concentrations can be made unless there are continuous observations of solar radiation and ozone concentration at each high-volume sampling site.

1. Air Quality Assessment Studies for the City of Sault Ste. Marie (1970-1975), Northeastern Region, Ontario, Ministry of Environment (June 1976).
2. Lane, D.A. and Katz, M., Fate of Pollutants in the Air and Water Environment, Part 2, John Wiley & Sons Inc., p. 137-154 (1977).

09. CONCLUSIONS

Total reduced sulphur (TRS) and ozone (0_3) were the only gaseous pollutants detected in ground-level concentrations exceeding their Ontario 30-minute Guideline and Standard, respectively, during the survey period. The single ozone excursion above the Standard was probably due to long-range transport from the south-west. However, the excessive TRS during 5 of the 22 monitoring periods was clearly shown to have originated from the Algoma steel mill.

Sulphur dioxide (SO_2) and nitrogen oxides (NOx) were not detected in significant ground-level concentrations during the survey period.

High-Volume sampling resulted in many of the samples having TSP mass concentrations in excess of the Ontario Air Quality Criterion. Each sampling location showed relative maxima of TSP and iron (Fe) concentrations when the average wind direction coincided with the direction of the Algoma steel mill.

Manganese (Mn) was detected only in relatively small concentrations during the survey period. Despite the small Mn concentrations, there was a fairly high correlation coefficient (0.88) between the Mn and Fe mass concentrations for the 51 samples, which indicates a common source for both pollutants.

Each of the high-volume sampling locations had relatively high background levels of total carbon and free carbon, which probably originated from the accumulated deposits in all neighbourhoods due to the presence of the Algoma steel mill. Most of the larger concentrations at each sampling location occurred when the winds were from the direction of the Algoma steel mill or its by-products plants and slag heap areas located west of the steel mill.

The sulphate ($SO_4^=$) concentrations directly due to the Algoma steel mill emissions can be estimated in the range of 9-14 ug/m^3. A background concentration of 10-12 ug/m^3 $SO_4^=$ was found but the source was not readily

apparent. This is because long-range transport of $SO_4^=$ from the south and south-west was also occurring and contributed varying amounts (2-25 ug/m^3) to the ambient air.

The mass concentrations of silica (SiO_2) were roughly equivalent at the 3 locations where it was monitored, with geometric means lying in the range 7.4 to 8.2 ug/m^3. The results do not permit a conclusive statement on SiO_2 emissions from the Algoma steel mill.

Contributions of polycyclic aromatic hydrocarbons (PAH) to the ambient air by the Algoma steel mill emissions are strongly indicated by the results when the wind directions are taken into account. Sampling location distance from the center of the mill appears to be a factor in the results, though a strictly linear relationship between PAH concentration and distance does not exist.

10. APPENDIX

A. Glossary

Scan Time: Time interval for averaging and data logging of instantaneous interrogations of the monitoring instruments by the data acquisition system.

Time: Times of first and final scans used to determine running averages.

Number of Readings: Number of Scans

MAM: Mobile Air Monitoring

MHAC: Maximum half-hour average concentration for a monitoring period.

GLC: Ground-level concentration

B. Concentration/Time Graphs

Monitoring	Period	#1	TRS, 0_3	and	SO_2	Figure #1
Monitoring	Period	#1	NOx	and	TH-M	Figure #2
Monitoring	Period	#5	TRS, NOx	and	SO_2	Figure #3
Monitoring	Period	#8	TRS	and	SO_2	Figure #4
Monitoring	Period	#10	TRS, NOx	and	THC	Figure #5
Monitoring	Period	#11	TRS, NOx	and	THC	Figure #6
Monitoring	Period	#12	TRS, NOx	and	SO_2	Figure #7
Monitoring	Period	#14	TRS, NOx	and	SO_2	Figure #8
Monitoring	Period	#15	TRS, NOx	and	SO_2	Figure #9
Monitoring	Period	#17	TRS, 0_3	and	SO_2	Figure #10
Monitoring	Period	#18	TRS, 0_3	and	SO_2	Figure #11
Monitoring	Period	#19	TRS, 0_3	and	SO_2	Figure #12
Monitoring	Period	#20	TRS, 0_3	and	SO_2	Figure #13
Monitoring	Period	#21	TRS, 0_3	and	SO_2	Figure #14
Monitoring	Period	#22	TRS, 0_3	and	SO_2	Figure #15
Monitoring	Period	#23	TRS, 0_3	and	SO_2	Figure #16
Monitoring	Period	#24	TRS, 0_3	and	SO_2	Figure #17
Monitoring	Period	#25	TRS, 0_3	and	SO_2	Figure #18
Monitoring	Period	#26	TRS, 0_3	and	SO_2	Figure #19
Monitoring	Period	#27	TRS, 0_3	and	SO_2	Figure #20

C. Wind/Pollution Roses

Monitoring	Period	#1	NOx	Figure #21
Monitoring	Period	#17	TRS	Figure #22
Monitoring	Period	#24	TRS	Figure #23
Monitoring	Period	#25	TRS	Figure #24
Monitoring	Period	#25	0_3	Figure #25
Monitoring	Period	#26	TRS	Figure #26
Monitoring	Period	#26	SO_2	Figure #27
Monitoring	Period	#27	TRS	Figure #28
Monitoring	Period	#27	SO_2	Figure #29
High-Volume	Sampling		PAH	Figure #30

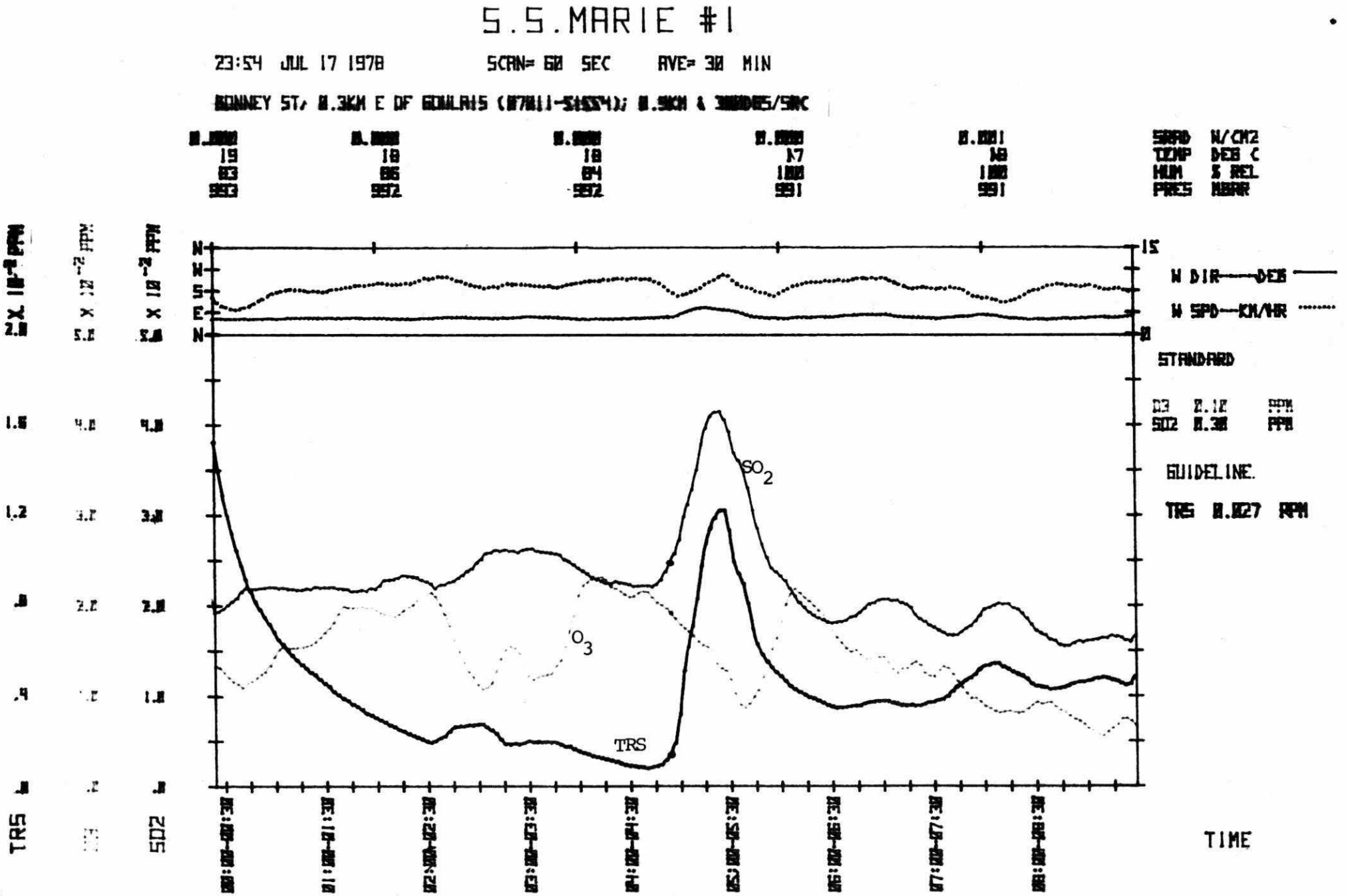

S.S.MARIE #1
23:54 JUL 17 1978
SCAN= 60 SEC
AVE= 30 MIN
SRAD W/CM2
TEMP DEG C
HUM % REL
PRES MBAR
W DIR——DEG
W SPD---KM/HR
STANDARD
SO2 0.30 PPM
GUIDELINE.
TRS 0.027 PPM
SO_2
O_3
TRS
TRS
SO2
TIME

Figure 1

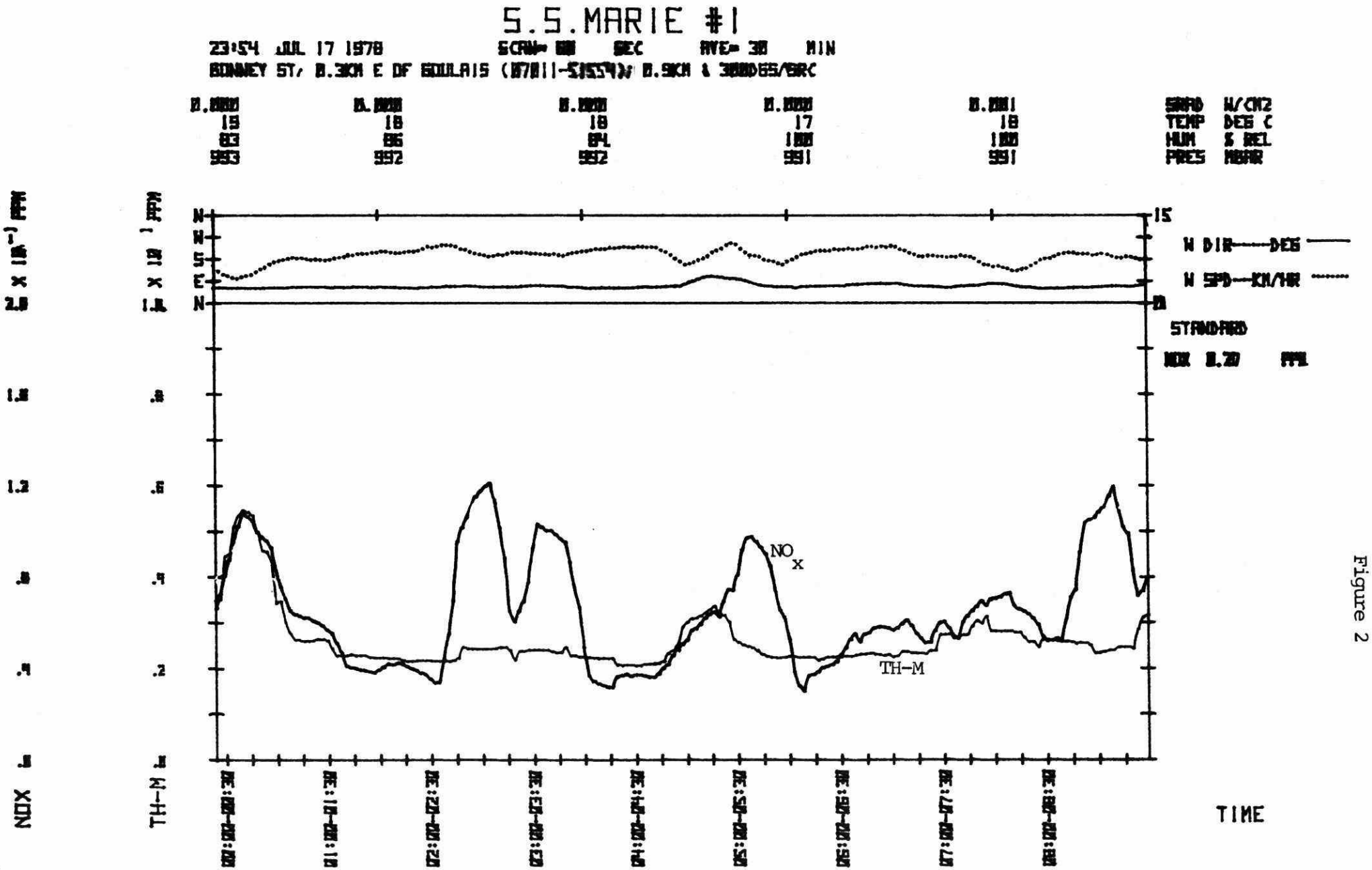

S.S.MARIE #1
23:54 JUL 17 1978
SCAN= 00 SEC AVE= 30 MIN
BONNEY ST, 8.3KM E OF SOULAIS (07811-51554); 8.9KM & 300065/ERC
SWRB W/CM2
TEMP DEG C
HUM % REL
PRES MBAR
W DIR——DEG
W SPD---KM/HR
STANDARD
NOX PPM
TH-M PPM
NOX
TH-M
TIME
NO x
TH-M

Figure 2

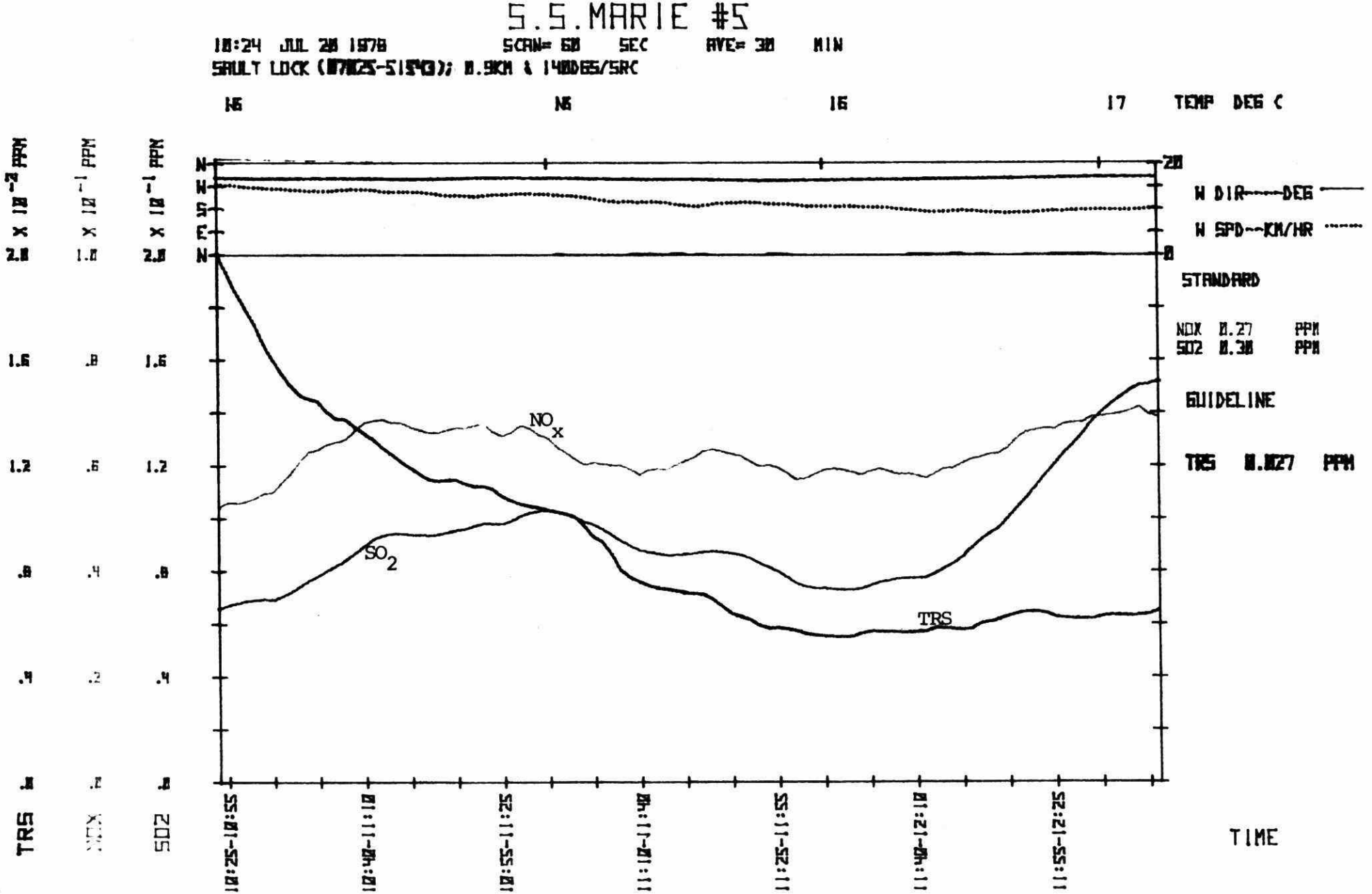
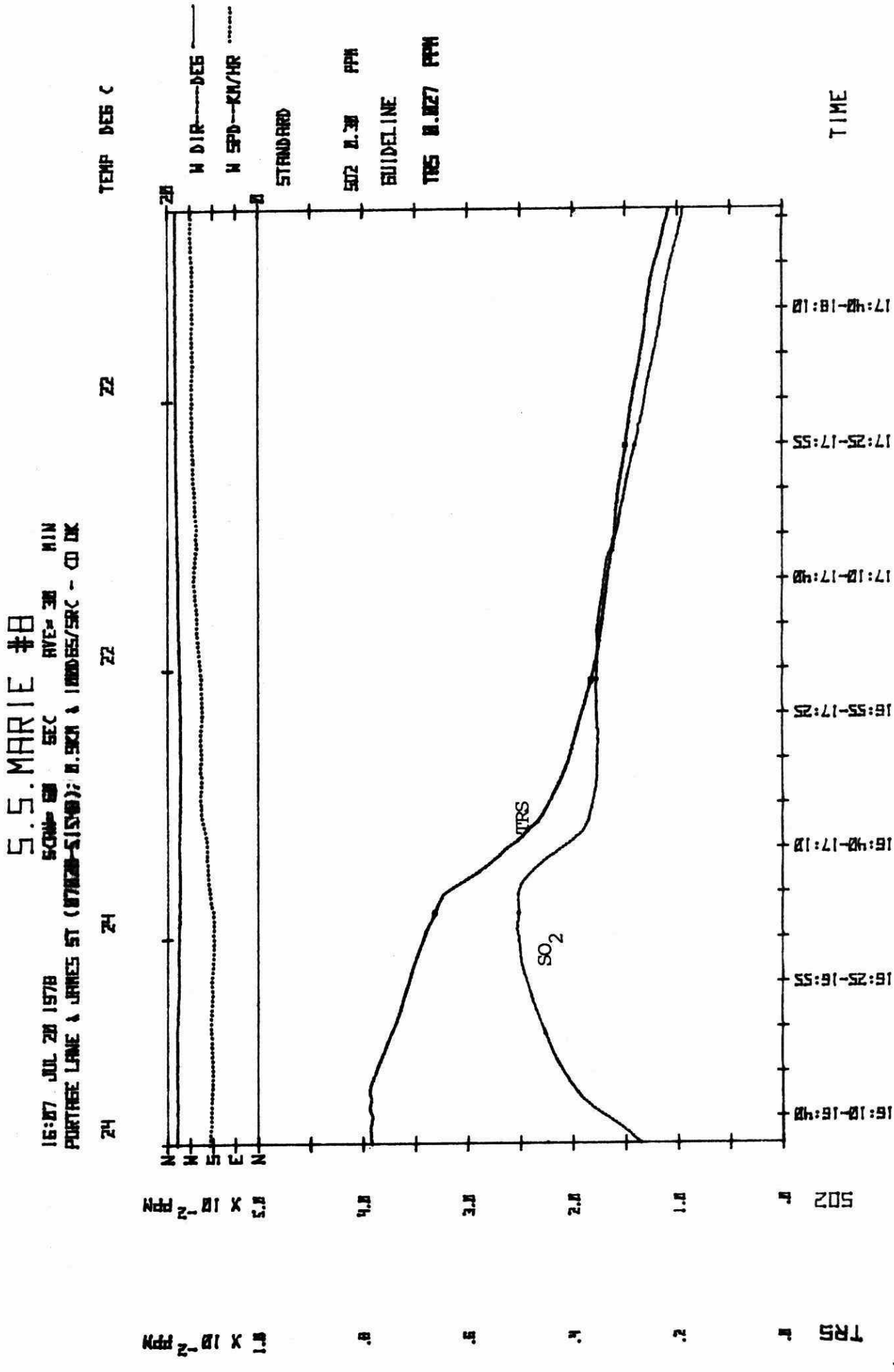

S.S.MARIE #5
18:24 JUL 28 1978
SCAN= 60 SEC
AVE= 30 MIN
SAULT LOCK (
16
16
17
TEMP DEG C
W DIR----DEG
W SPD--KM/HR
STANDARD
NOX 0.27 PPM
SO2 0.30 PPM
GUIDELINE
TRS 0.027 PPM
NOx
SO2
TRS
TIME
TRS
SO2

Figure 3

Figure 4


S.S. MARIE #8
TEMP DEG C
W DIR——DEG
W SPD--KM/HR
STANDARD
SO2 0.30 PPM
GUIDELINE
TRS 0.0027 PPM
TIME
TRS
SO2
17:40-18:10
17:25-17:55
17:10-17:40
16:55-17:25
16:40-17:10
16:25-16:55
16:10-16:40
TRS X 10⁻² PPM
SO2 PPM

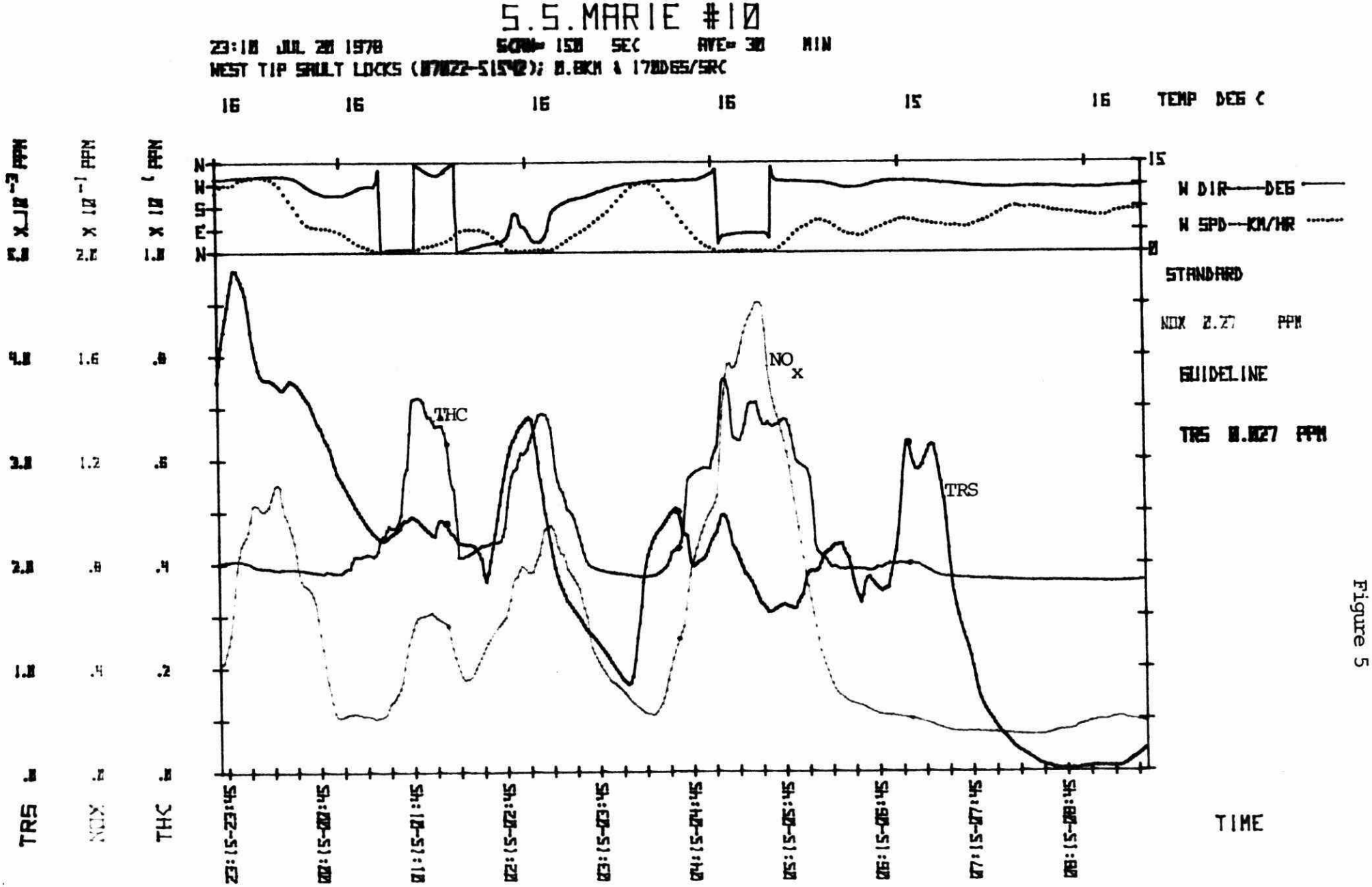

S.S.MARIE #10
23:10 JUL 28 1978
WEST TIP SAULT LOCKS
TEMP DEG C
N DIR——DEG
N SPD---KM/HR
STANDARD
GUIDELINE
THC
NOx
TRS
TIME

Figure 5

Figure 6

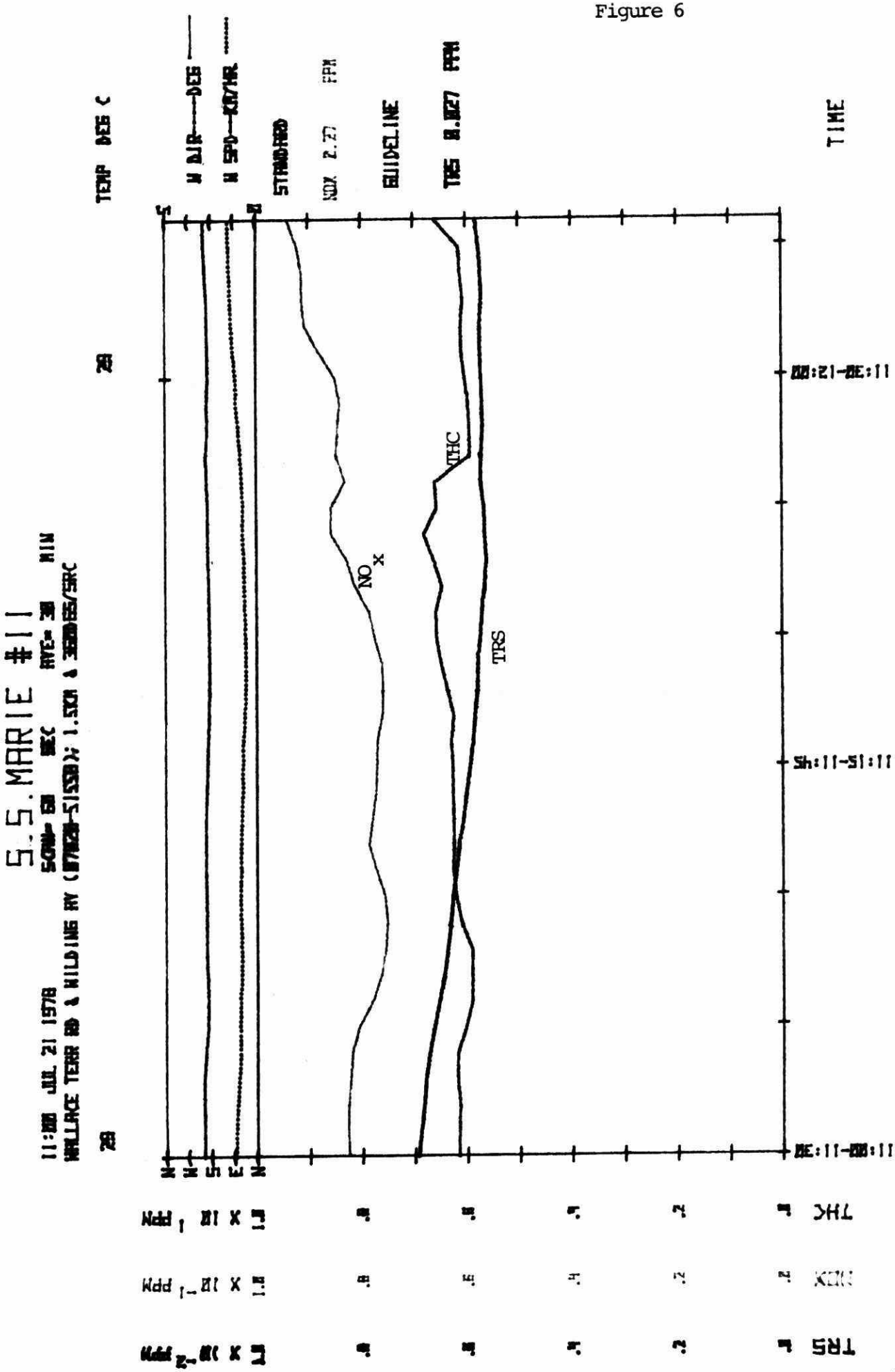


Figure 7

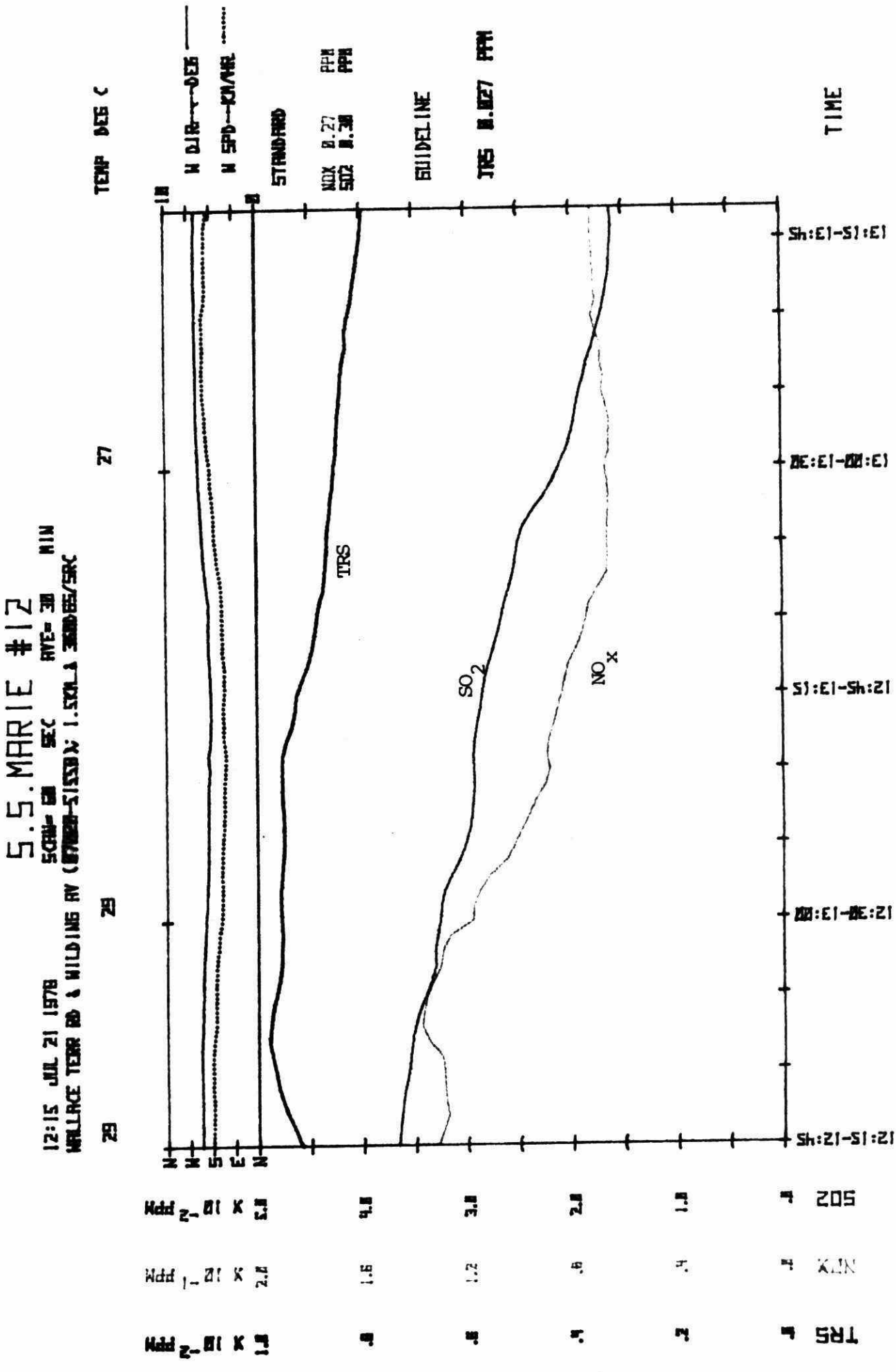
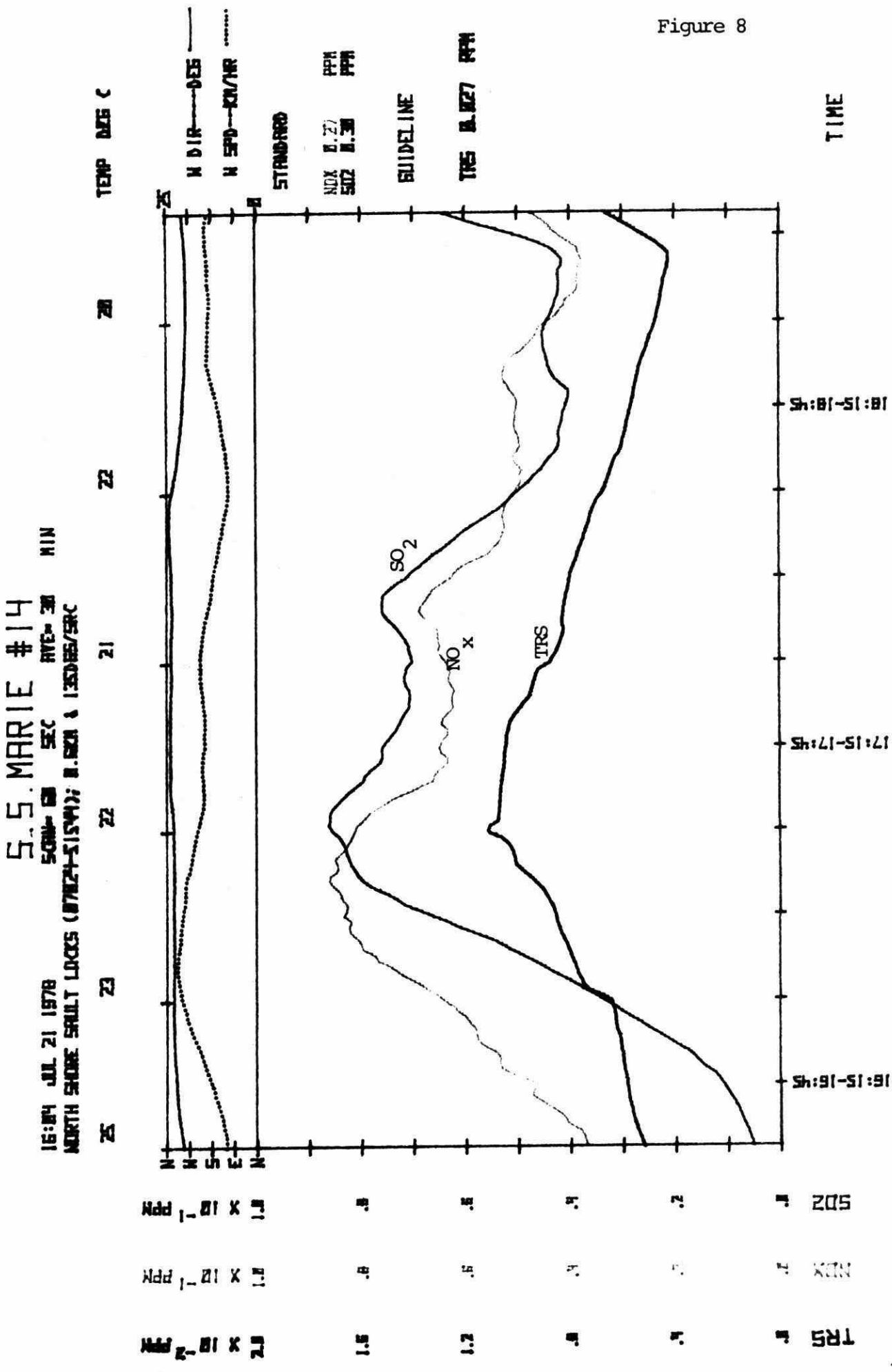

S.S. MARIE #12
12:15 JUL 21 1978
TEMP DEG C
TIME
STANDARD
GUIDELINE
TRS
SO2
NOX
TRS
SO2
NOX

Figure 8


S.S. MARIE #14
16:8M JUL 21 1978
NORTH SHORE SAULT LOCKS
TEMP DEG C
N DIR
N SPD
STANDARD
NOX
SO2
BASELINE
TRS
TIME
SO_2
NO_x
TRS
SO2
NOX
TRS

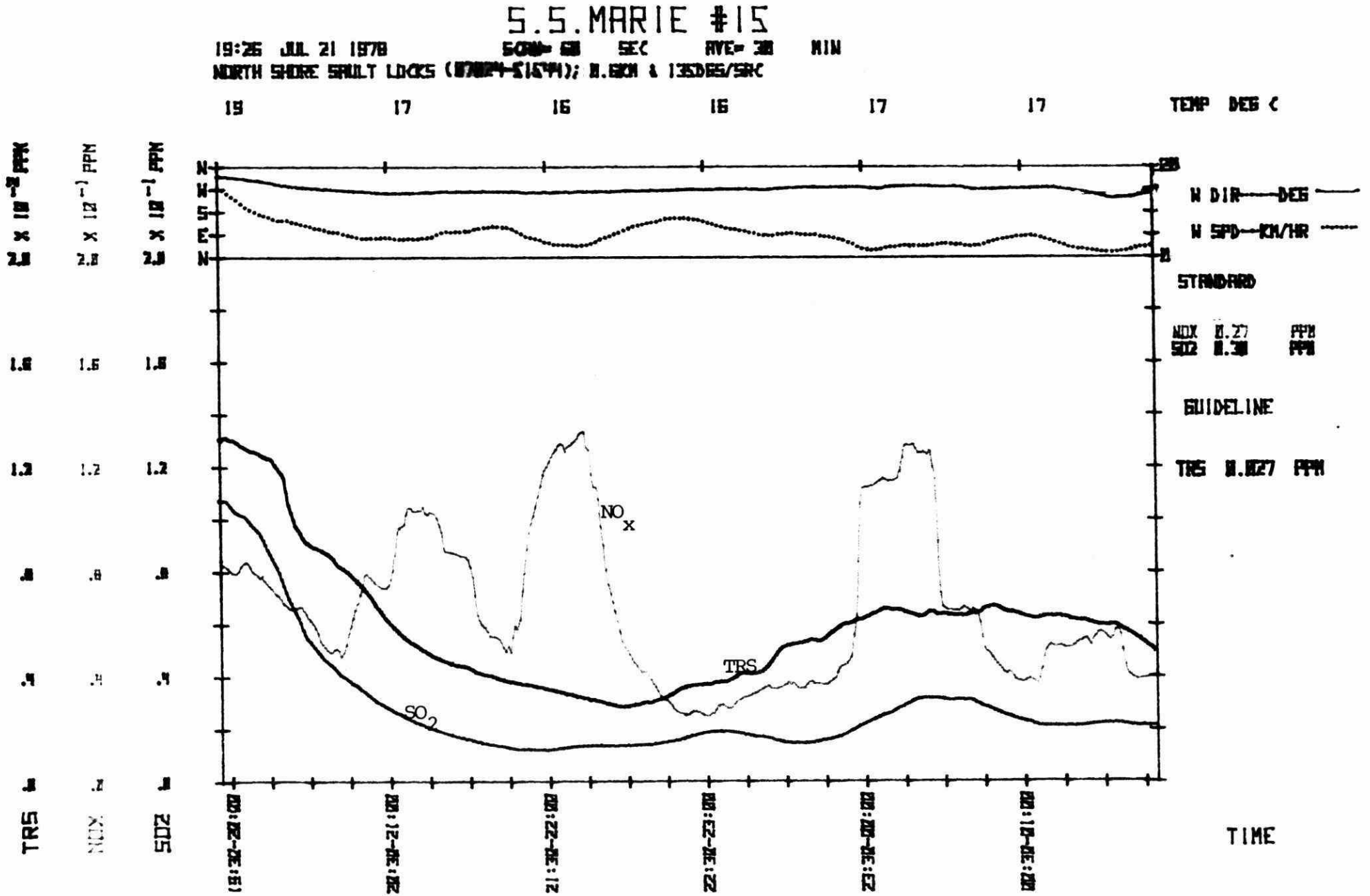

S.S.MARIE #15
19:26 JUL 21 1978
NORTH SHORE SAULT LOCKS
TEMP DEG C
N DIR——DEG
N SPD——KM/HR
STANDARD
NOX 0.27 PPM
SO2 0.38 PPM
GUIDELINE
TRS 0.027 PPM
NOx
TRS
SO2
TIME
TRS
NOX
SO2

Figure 9

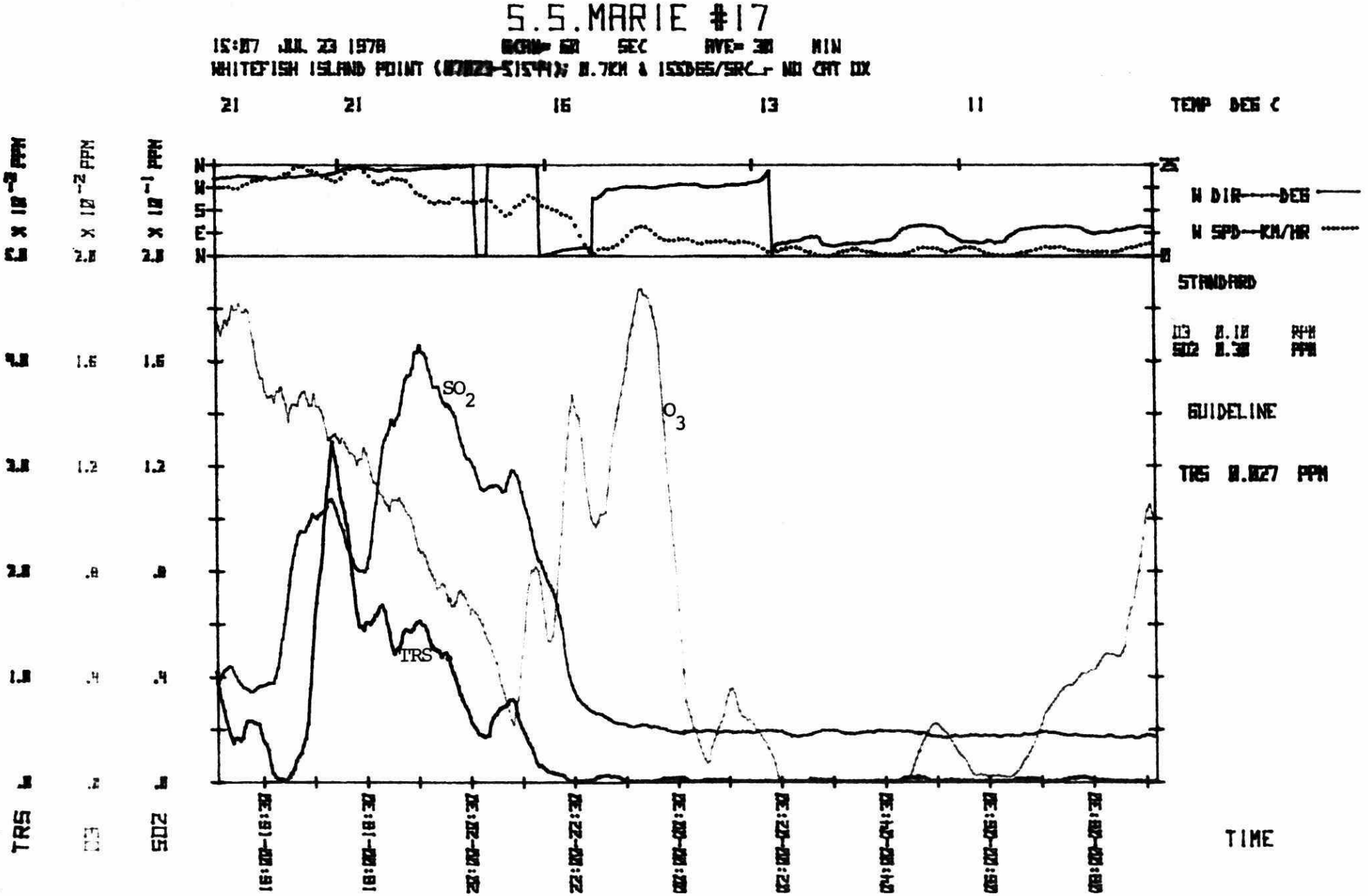

S.S.MARIE #17
15:07 JUL 23 1978
WHITEFISH ISLAND POINT
21
21
16
13
11
TEMP DEG C
W DIR---DEG
W SPD---KM/HR
STANDARD
O3 0.10 PPM
SO2 0.30 PPM
GUIDELINE
TRS 0.027 PPM
SO2
O3
TRS
TRS
SO2
TIME

Figure 10

Figure 11

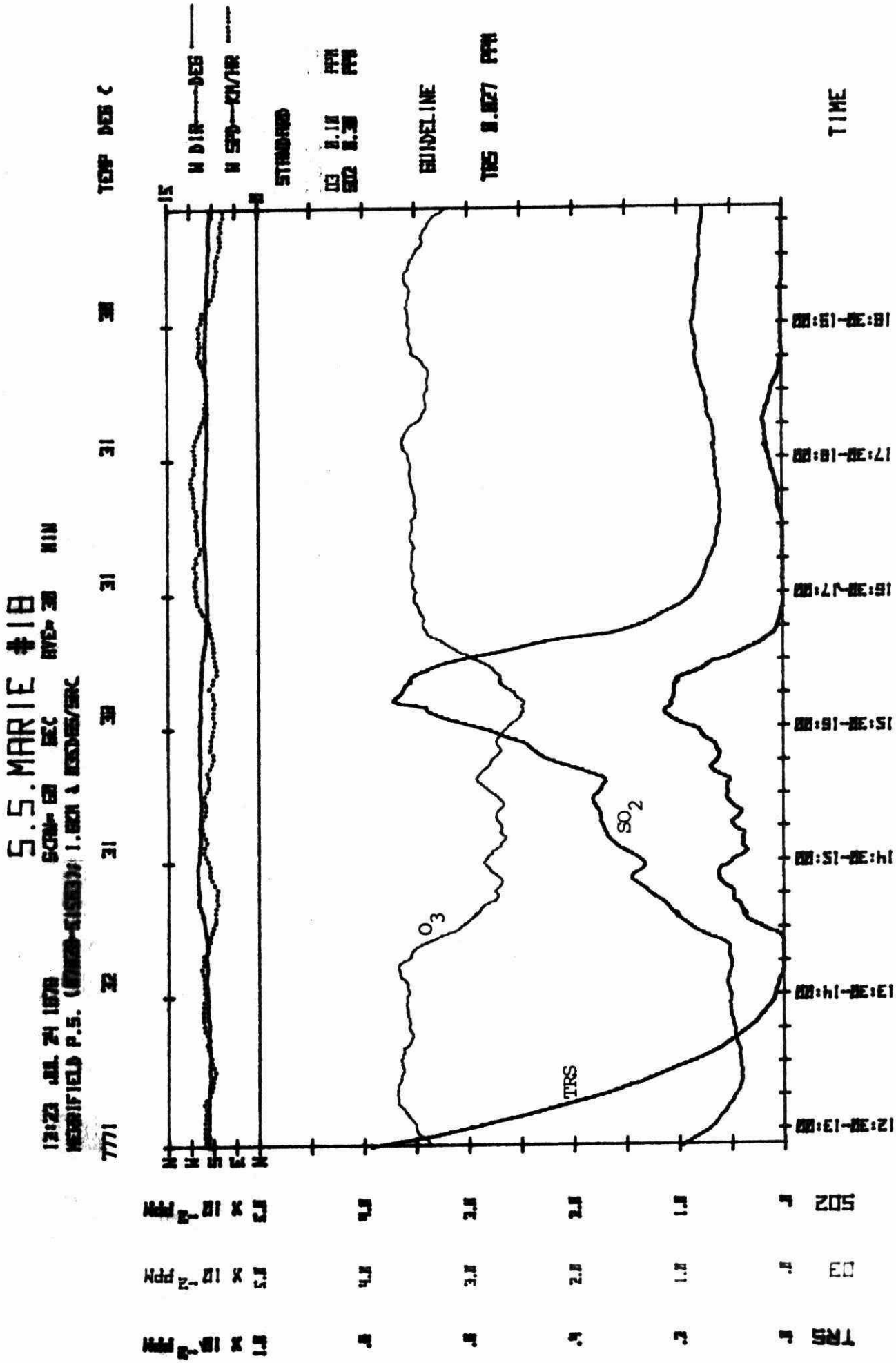


Figure 12

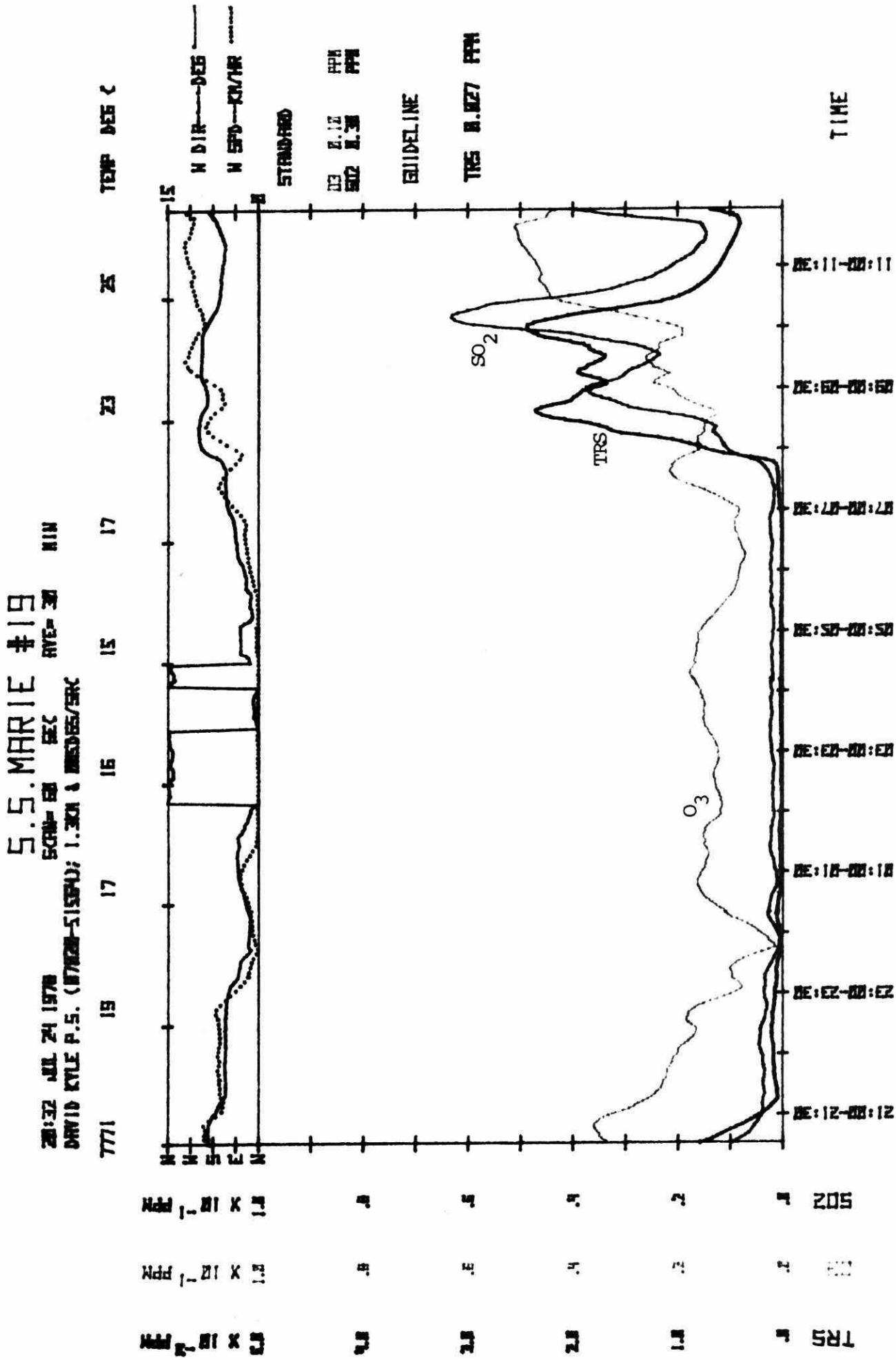
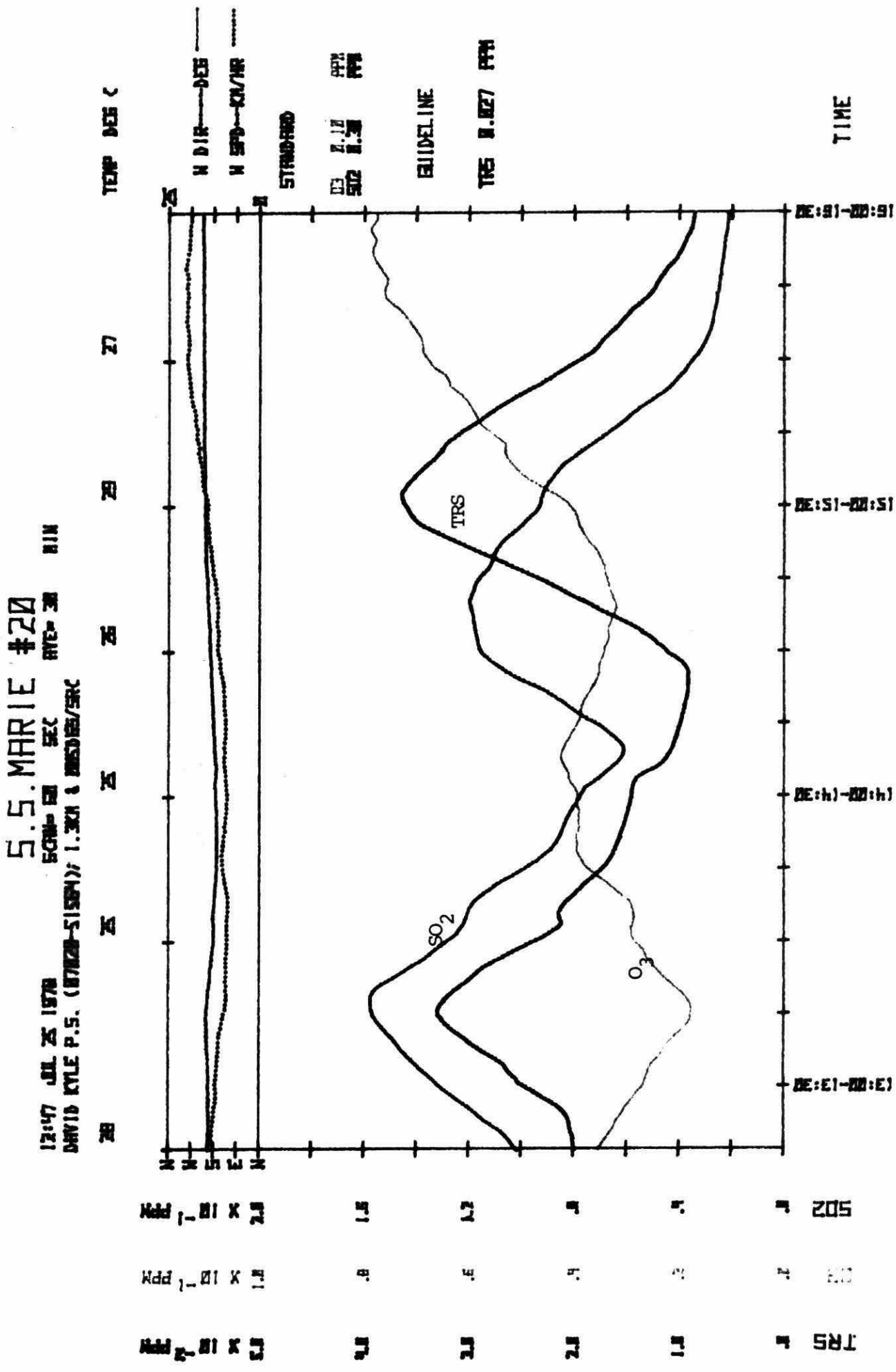

S.S. MARIE #19
TIME
TRS
SO2
O3
STANDARD
BASELINE
TEMP DEG C
N DIR
N SPD
TRS 0.027 PPM

Figure 13



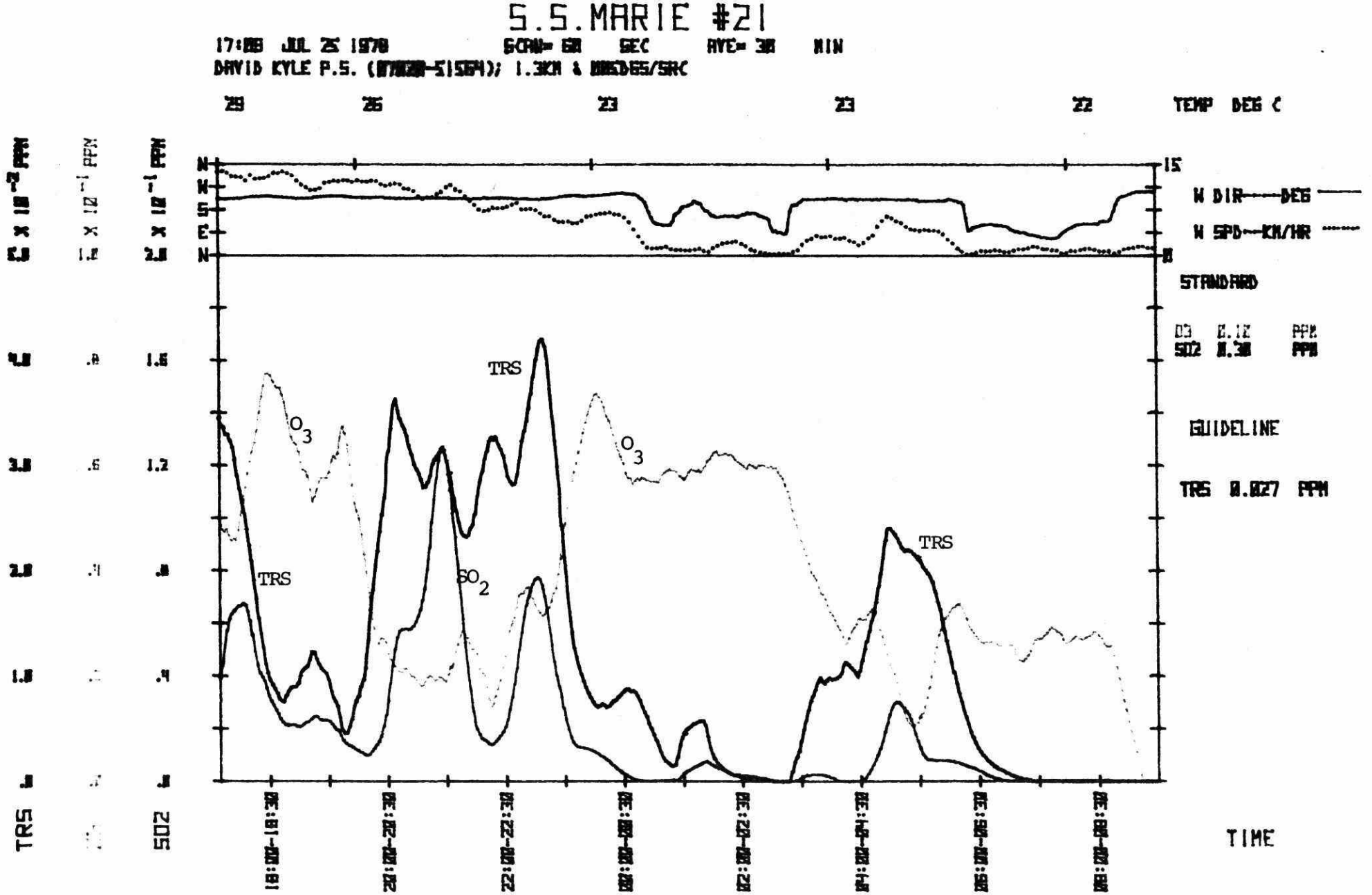

S.S.MARIE #21
17:00 JUL 25 1978
SCAN= 60 SEC
AVE= 30 MIN
DAVID KYLE P.S. (
TEMP DEG C
W DIR---DEG
W SPD---KM/HR
STANDARD
O3 0.12 PPM
SO2 0.30 PPM
GUIDELINE
TRS 0.027 PPM
TRS
O3
SO2
TIME

Figure 14

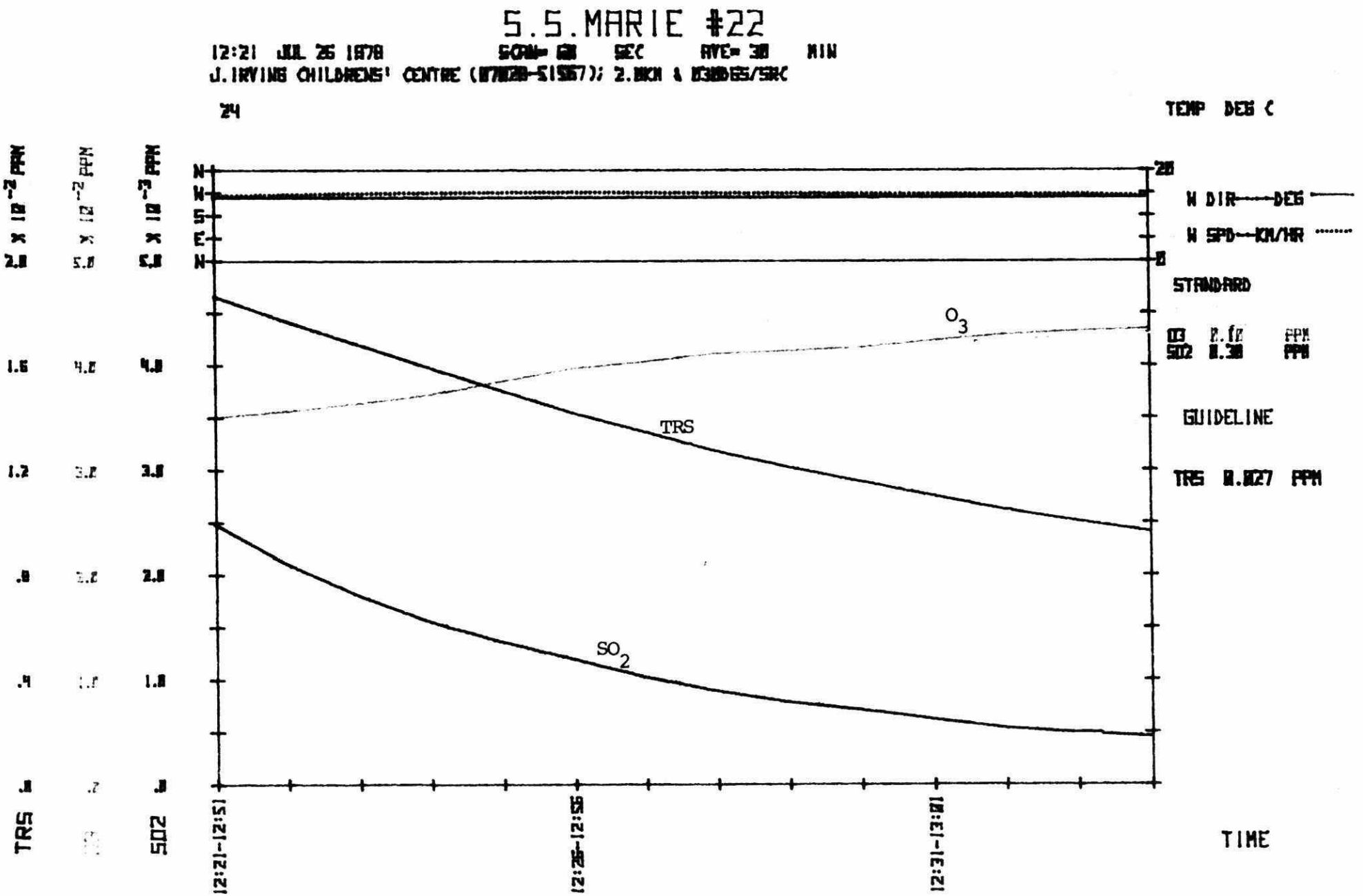

S.S.MARIE #22
12:21 JUL 26 1978
J.IRVING CHILDRENS' CENTRE
24
TEMP DEG C
W DIR——DEG
W SPD---KM/HR
STANDARD
GUIDELINE
TRS 0.027 PPM
O_3
TRS
SO_2
TRS
SO2
TIME
12:21-12:51
12:26-12:55
12:31-13:01

Figure 15

Figure 16

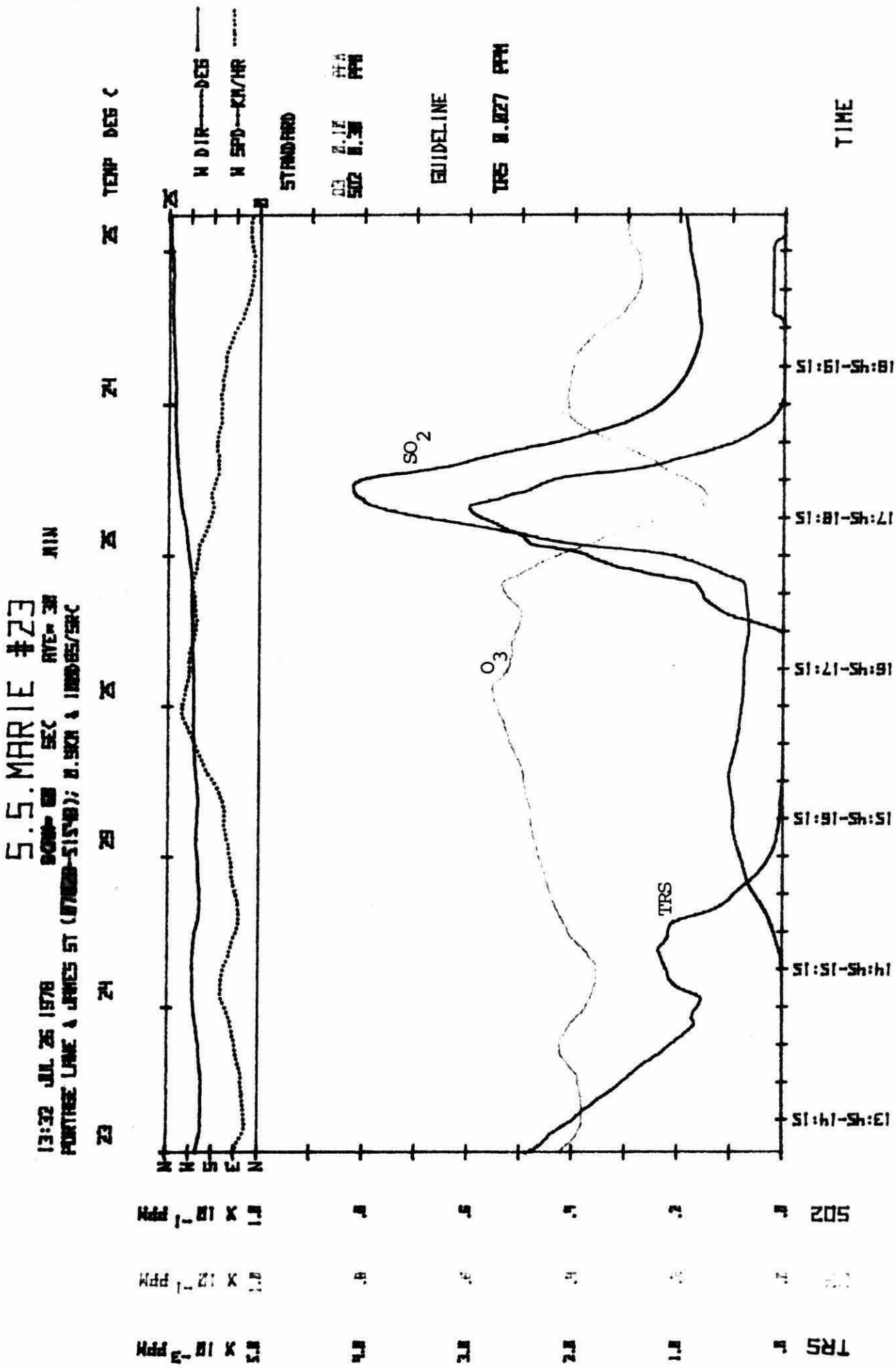

S.S. MARIE #23
13:32 JUL 26 1978
TIME
TEMP DEG C
N DIR——DEG
N SPD--KM/HR
STANDARD
GUIDELINE
SO_2
O_3
TRS
SO2
TRS

Figure 17

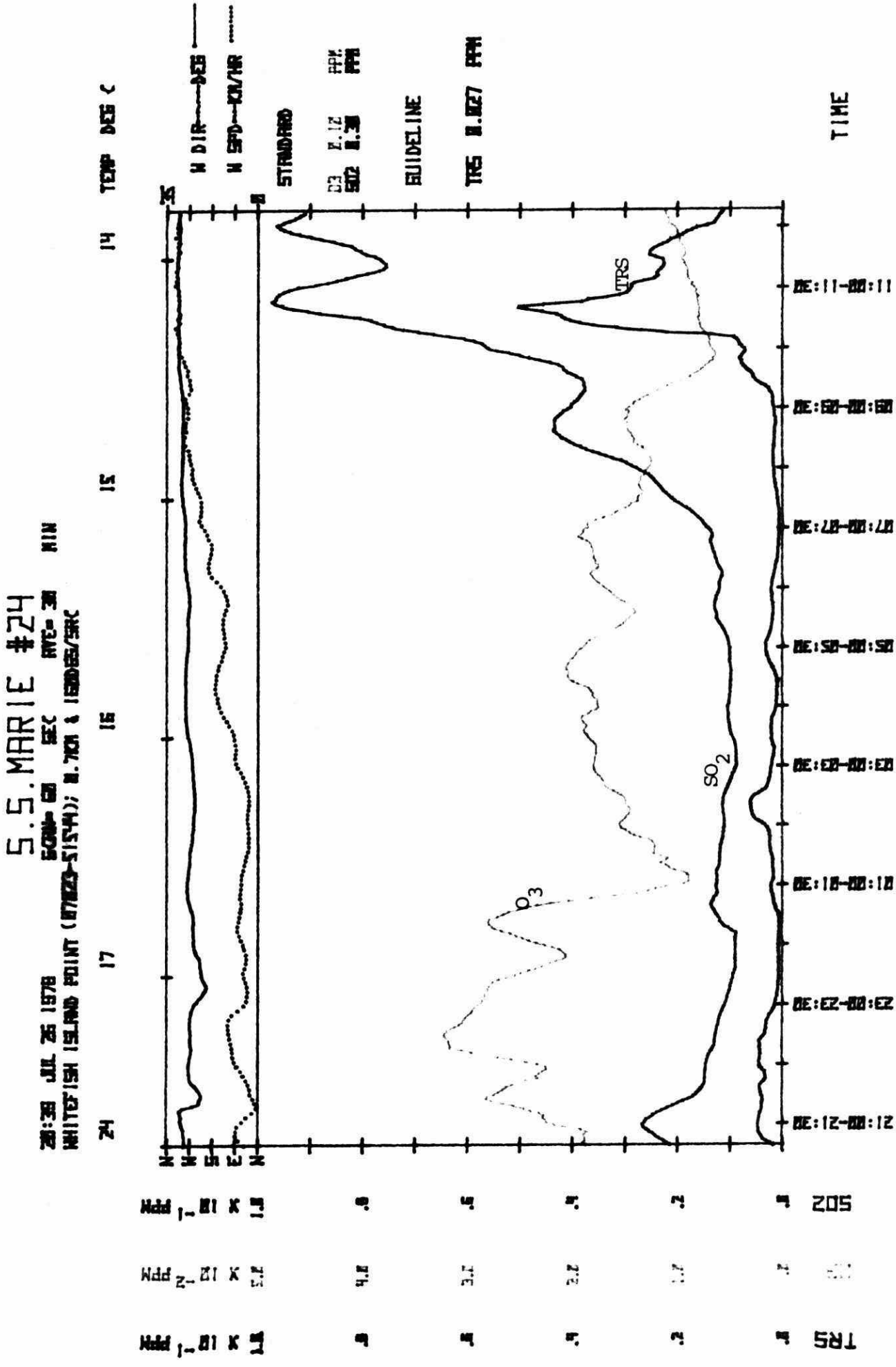

S.S. MARIE #24
WHITEFISH ISLAND POINT
STANDARD
GUIDELINE
TRS
TIME
SO_2
O_3
TRS
SO2

Figure 18

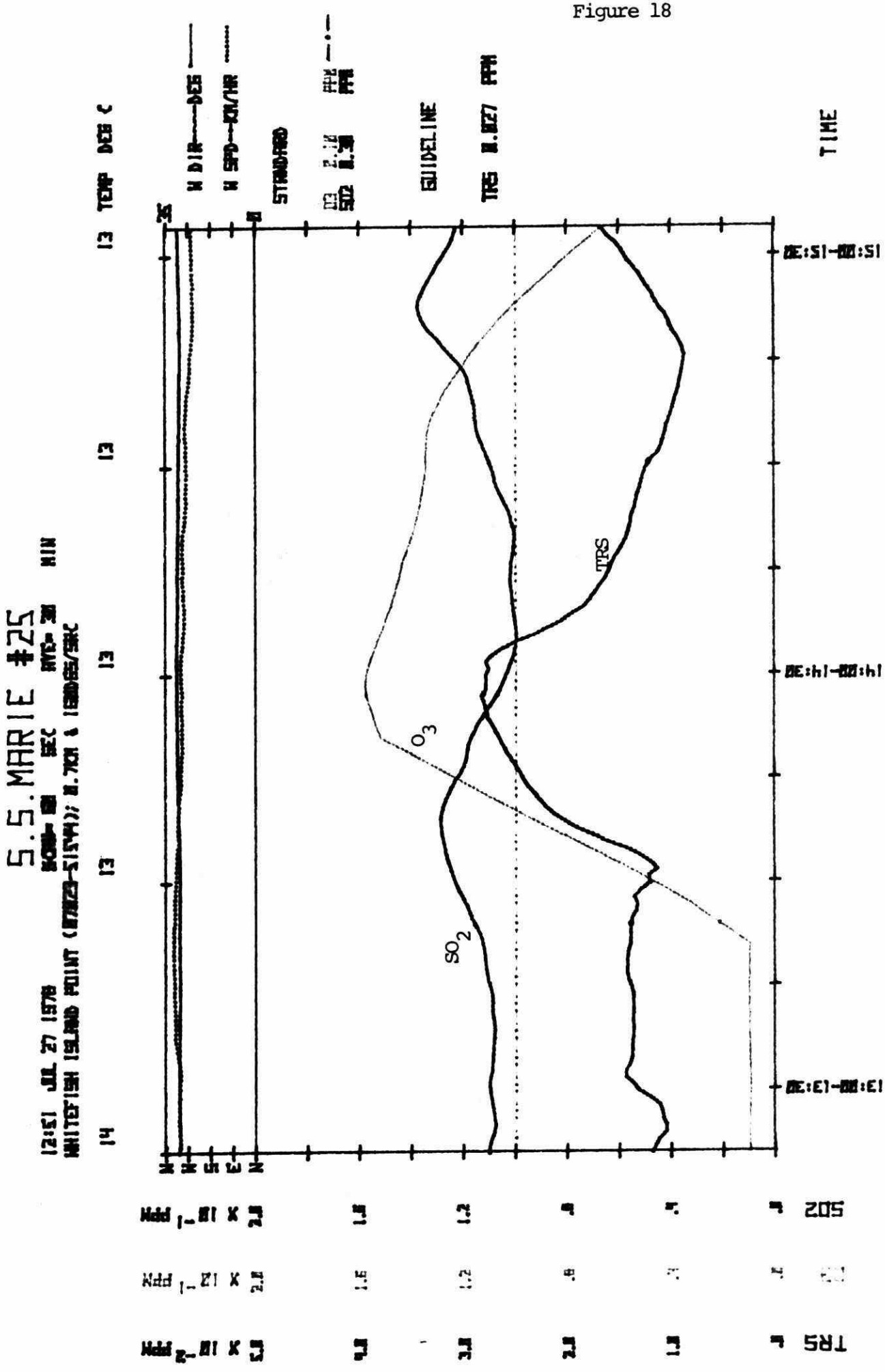
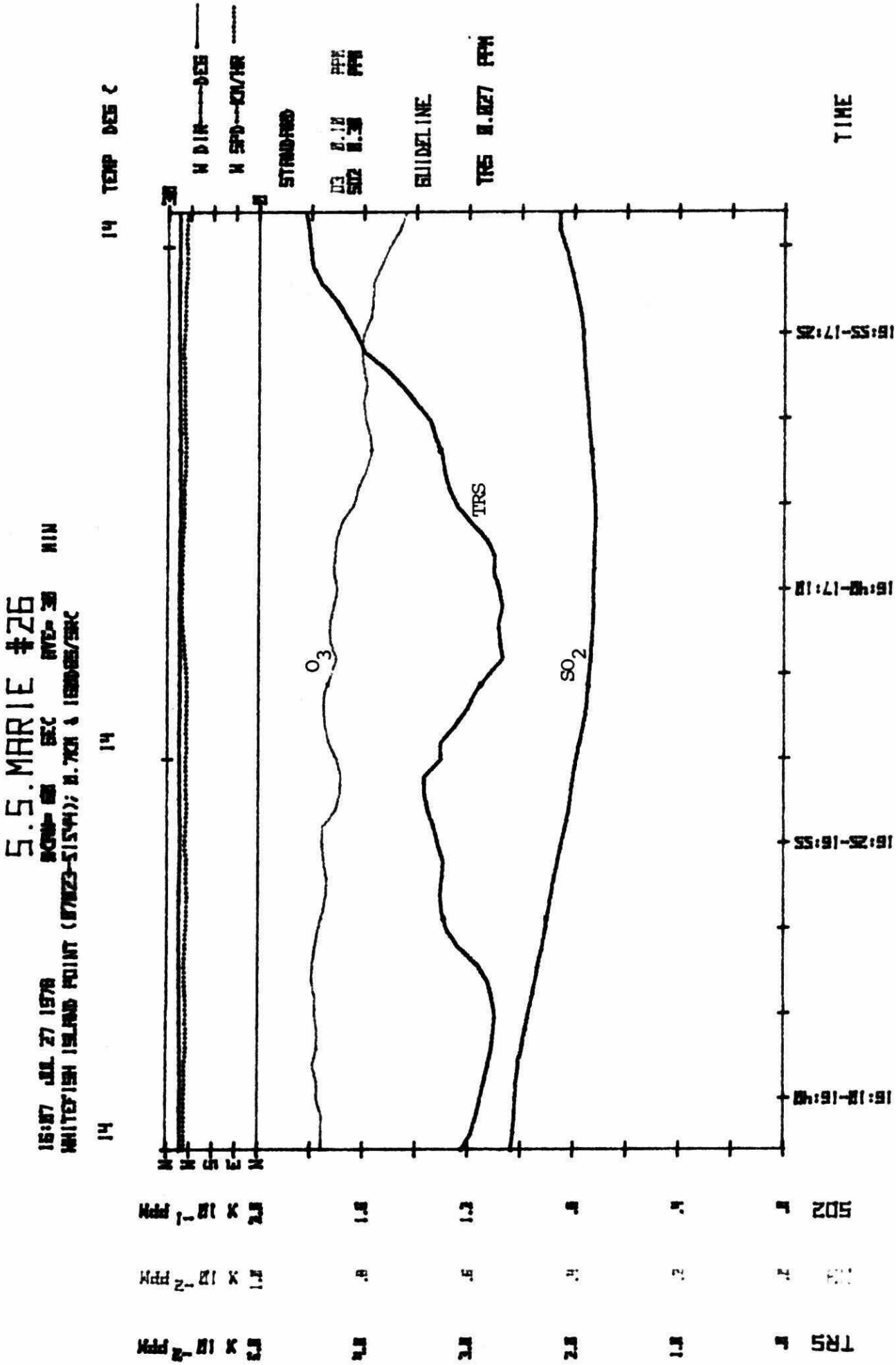


Figure 19


S.S. MARIE #26
TRS
SO_2
O_3
TIME
STANDARD
BASELINE
TRS 0.027 PPM
SO2 0.38
O3 0.12
SO2
TRS

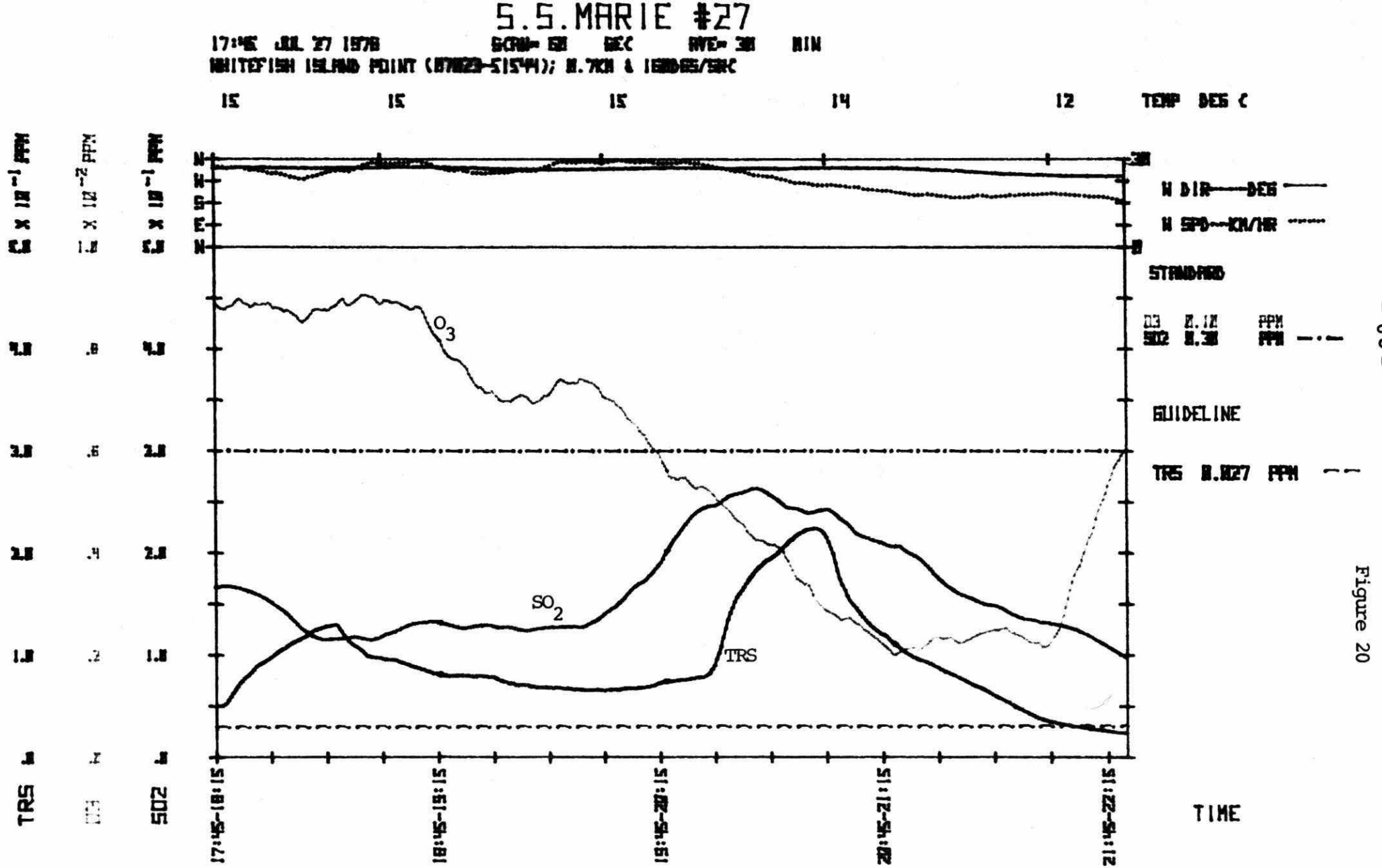

S.S.MARIE #27
TEMP DEG C
W DIR——DEG
W SPD---KM/HR
STANDARD
GUIDELINE
TRS 0.027 PPM
O3
SO2
TRS
TIME

Figure 20

S.S.MARIE #1

23:54 JUL 17 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 9.5 HRS MINIMUM MEAN= 0.01 PPM
DELAY= 0 MIN WIND RANGE= 3 , 30 KM/HR
LOC: BONNEY ST, 0.3KM E OF GOULAIS (07011-51554); 0.9KM & 300DGS/SRC

PREVAILING WINDS; BLOWING TOWARDS:
1 DIV= 10 %

ARITHMETIC MEAN: NOX
1 DIV= 0.01 PPM

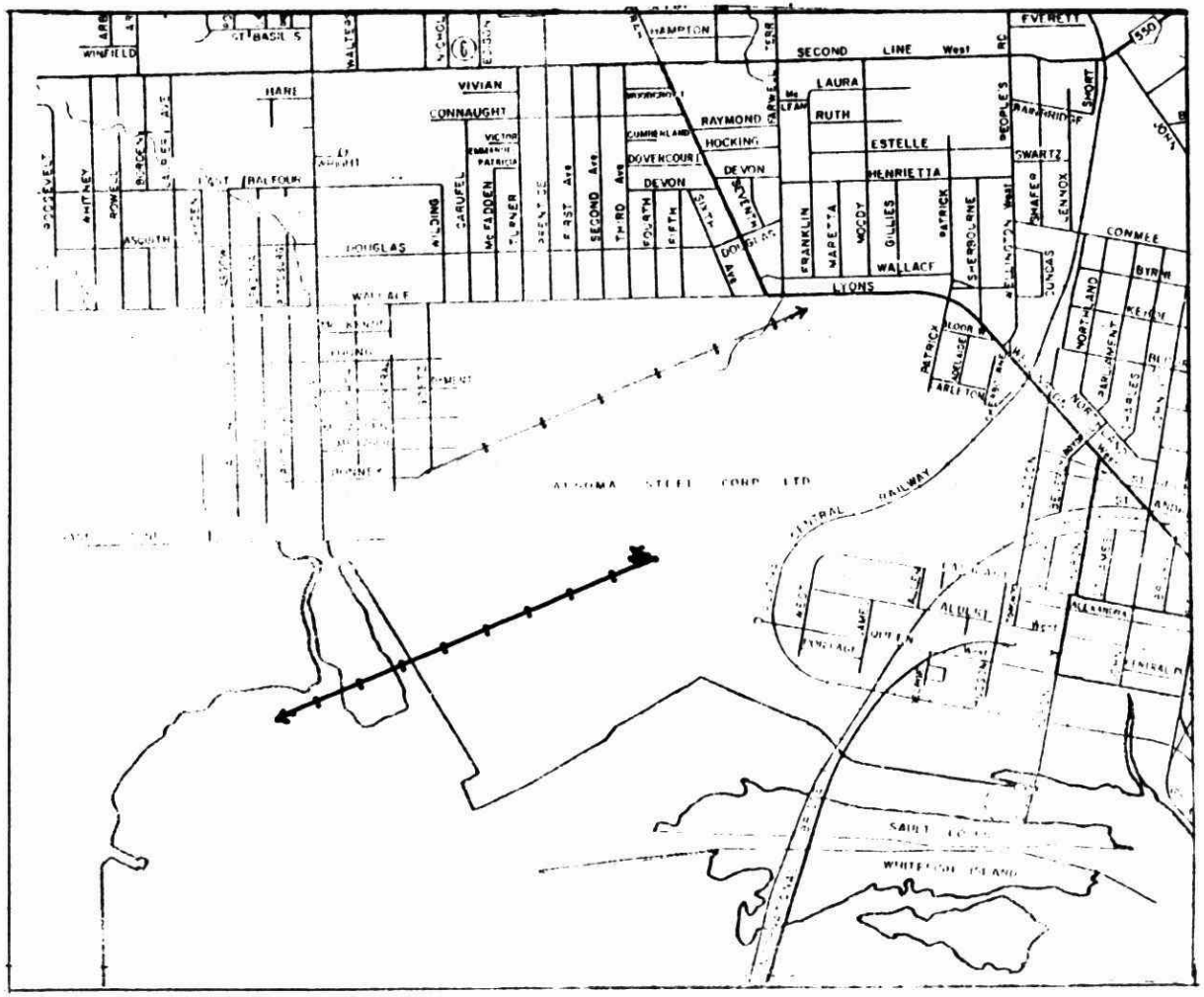


Figure 21

S.S.MARIE #17

15:07 JUL 23 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 18.5 HRS MINIMUM MEAN= 2.000000E-03 PPM
DELAY= 0 MIN WIND RANGE= 3 , 30 KM/HR
LOC: WHITEFISH ISLAND POINT (07024-51544); 0.7KM & 155DGS/SRC - NO CAT OX

PREVAILING WINDS; BLOWING TOWARDS: ARITHMETIC MEAN: TRS
1 DIV= 10 % 1 DIV= 0.01 PPM

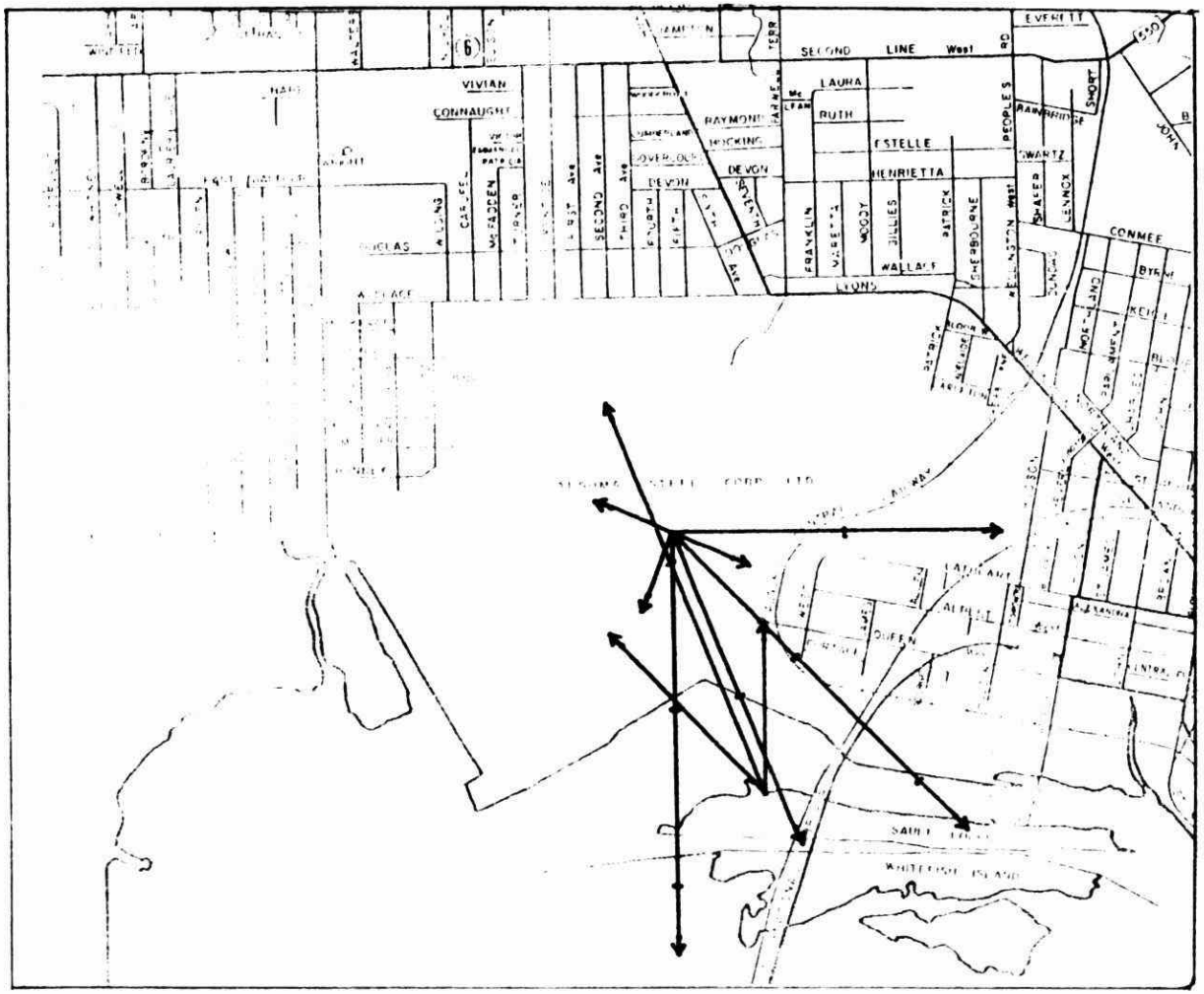


Figure 22

S.S.MARIE #24

20:39 JUL 26 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 16.1 HRS MINIMUM MEAN= 2.000000E-03 PPM
DELAY= 0 MIN WIND RANGE= 5 , 45 KM/HR
LOC: WHITEFISH ISLAND POINT (07023-51544); 0.7KM & 160DGS/SRC

PREVAILING WINDS: BLOWING TOWARDS
1 DIV= 10 %

ARITHMETIC MEAN: TRS
1 DIV= 0.01 PPM

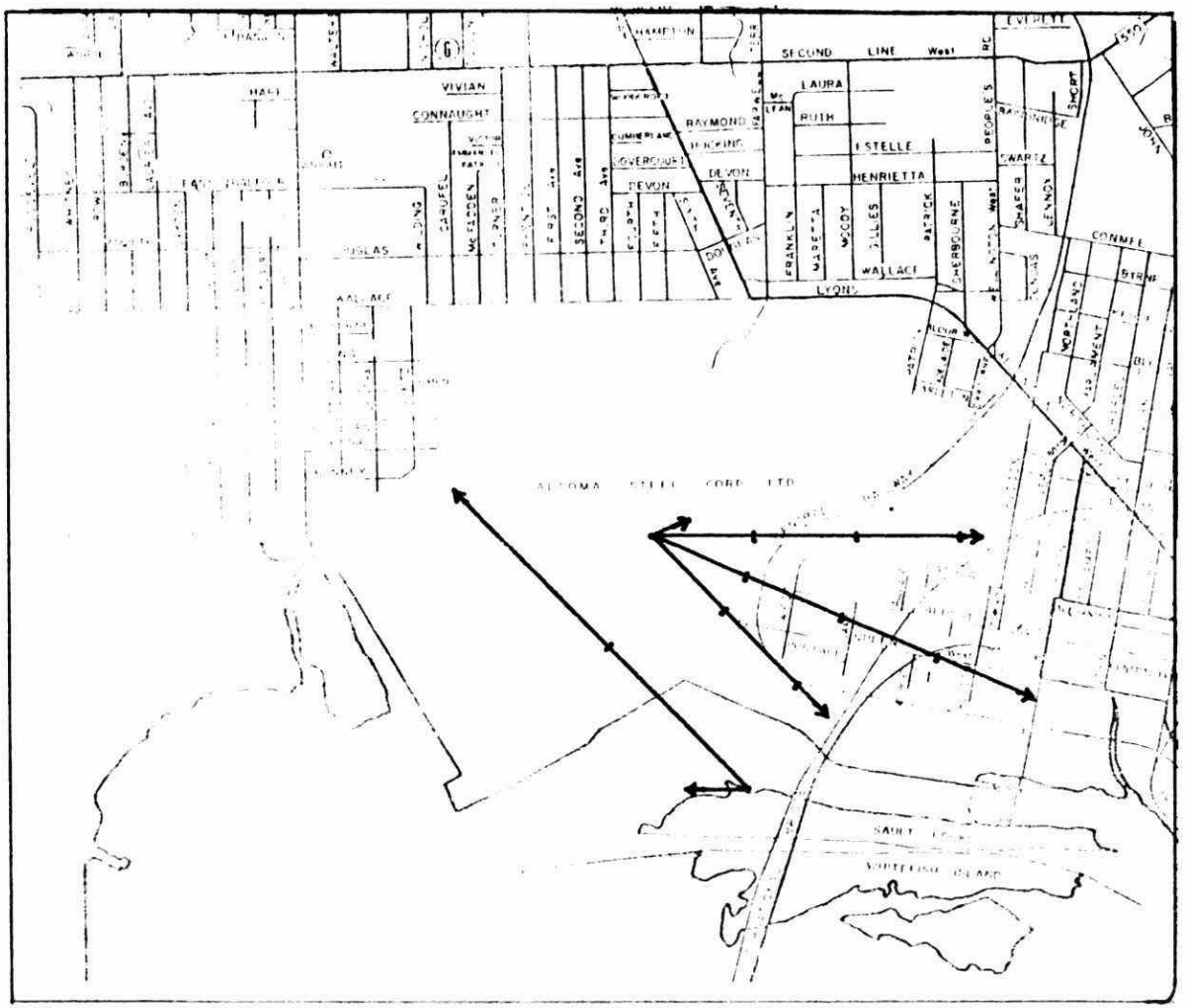


Figure 23

S.S.MARIE #25

12:51 JUL 27 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 2.7 HRS MINIMUM MEAN= 5.000000E-03 PPM
DELAY= 0 MIN WIND RANGE= 5 , 45 KM/HR
LOC: WHITEFISH ISLAND POINT (07023-51544); 0.7KM & 160DGS/SRC

PREVAILING WINDS; BLOWING TOWARDS: ARITHMETIC MEAN: TRS
1 DIV= 100 % 1 DIV= 0.01 PPM

Figure 24

S.S.MARIE #25

12:51 JUL 27 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 2.7 HRS MINIMUM MEAN= 1.000000E-03 PPM
DELAY= 0 MIN WIND RANGE= 5 , 45 KM/HR
LOC: WHITEFISH ISLAND POINT (07023-51544); 0.7KM & 160DGS/SRC

PREVAILING WINDS; BLOWING TOWARDS: ARITHMETIC MEAN: OZONE
1 DIV= 100 % 1 DIV= 0.01 PPM

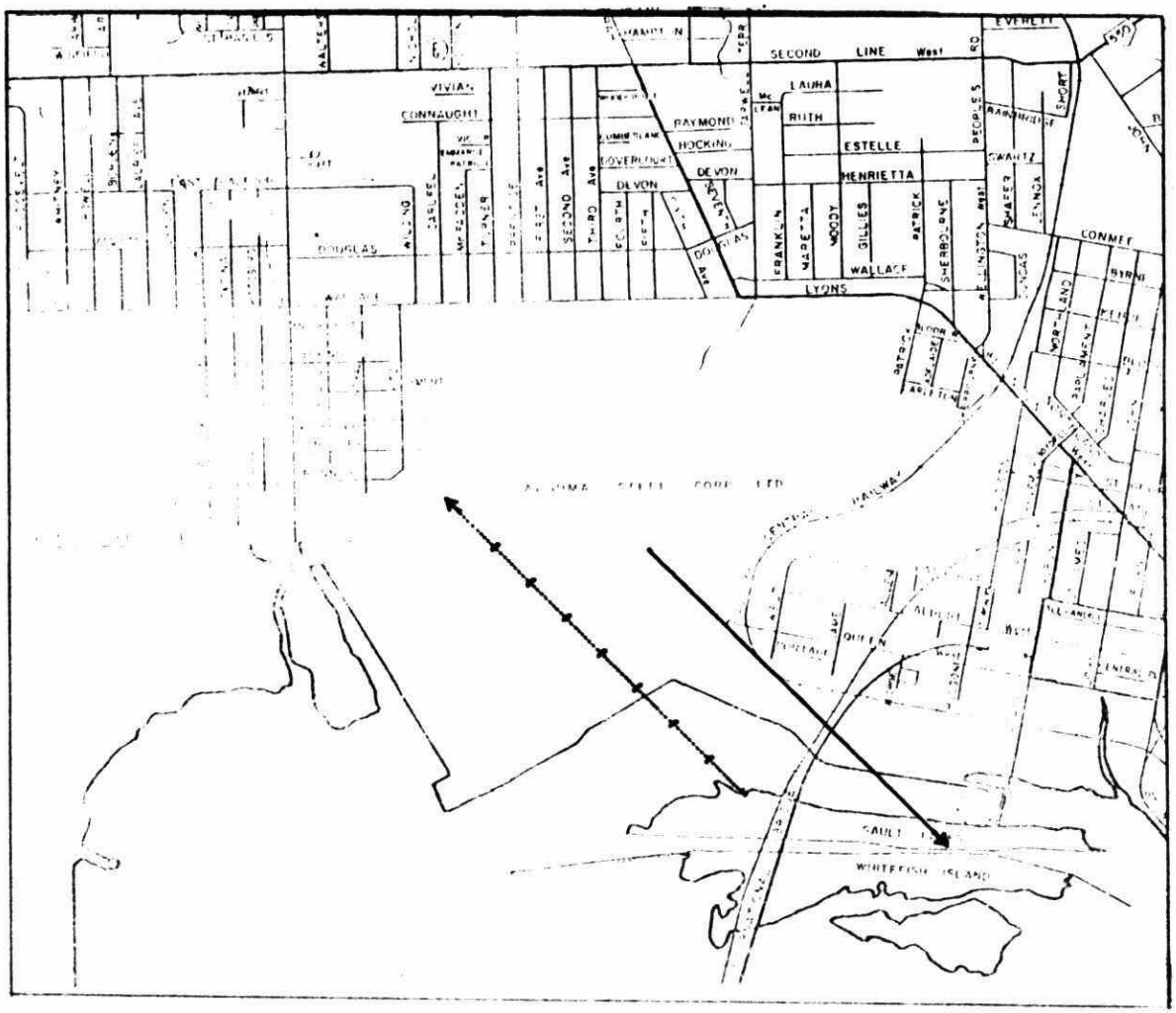


Figure 25

S.S.MARIE #26

16:07 JUL 27 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 1.4 HRS MINIMUM MEAN= 0.01 PPM
DELAY= 0 MIN WIND RANGE= 5 , 45 KM/HR
LOC: WHITEFISH ISLAND POINT (07023-51544); 0.7KM & 160DGS/SRC

PREVAILING WINDS; BLOWING TOWARDS: ARITHMETIC MEAN: TRS
1 DIV= 100 % 1 DIV= 0.01 PPM

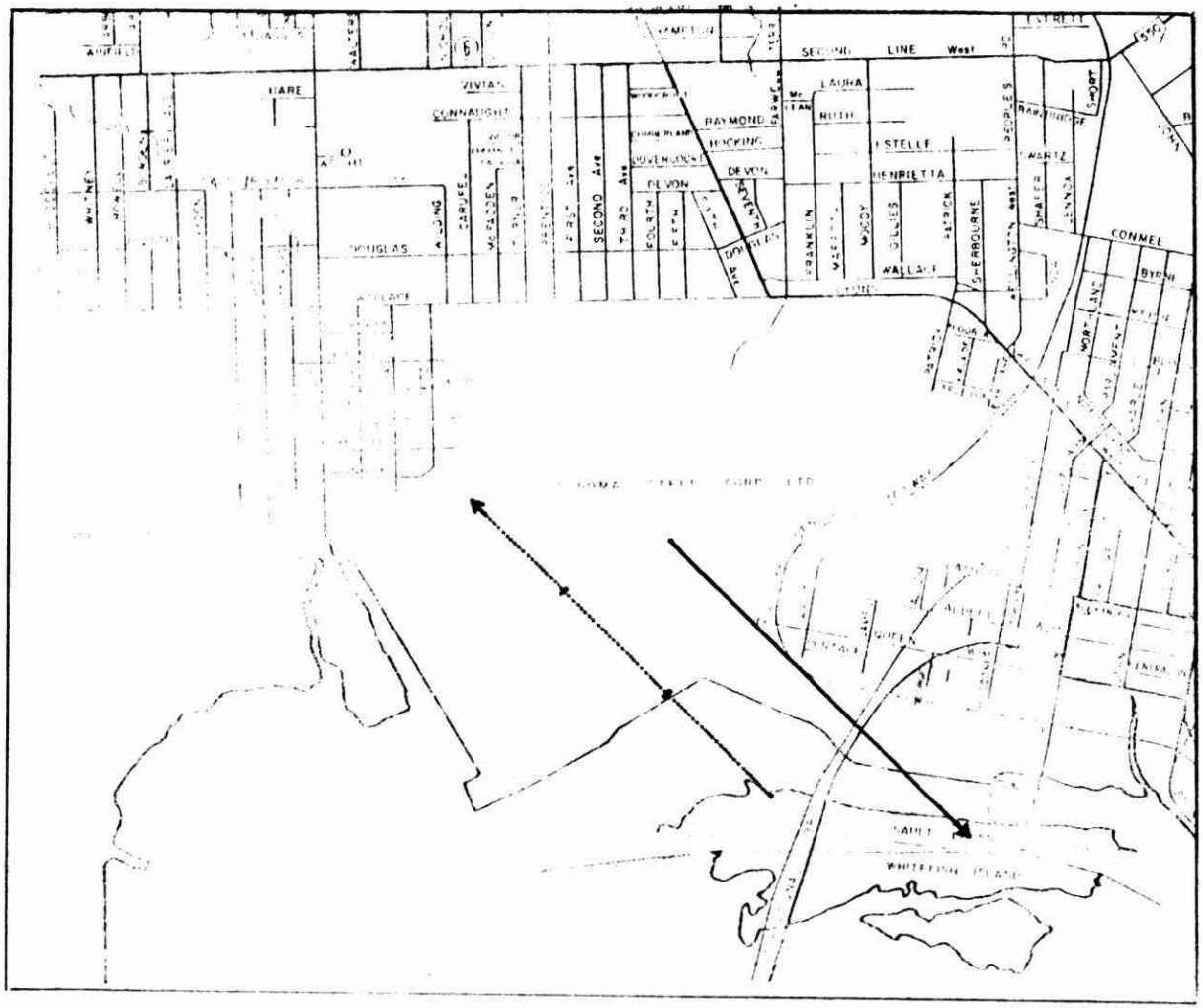


Figure 26

S.S.MARIE #26

16:07 JUL 27 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 1.4 HRS MINIMUM MEAN= 0.02 PPM
DELAY= 0 MIN WIND RANGE= 5 , 45 KM/HR
LOC: WHITEFISH ISLAND POINT (07023-51544); 0.7KM & 160DGS/SRC

PREVAILING WINDS; BLOWING TOWARDS: ARITHMETIC MEAN: 502
1 DIV= 100 % 1 DIV= 0.01 PPM

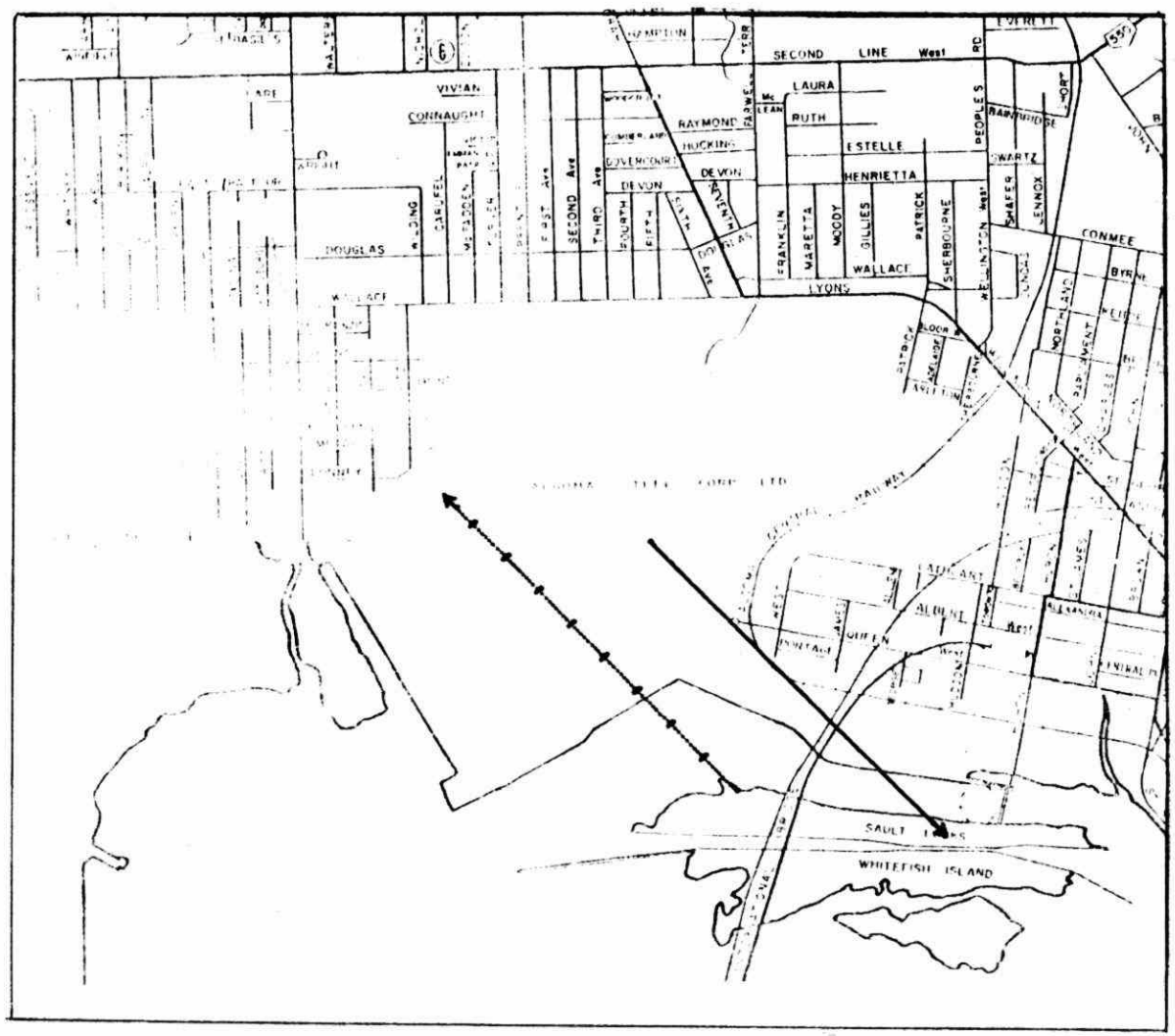


Figure 27

S.S.MARIE #27

17:45 JUL 27 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 4.5 HRS MINIMUM MEAN= 0.01 PPM
DELAY= 0 MIN WIND RANGE= 5 , 45 KM/HR
LOC: WHITEFISH ISLAND POINT (07023-51544); 0.7KM & 160DGS/SRC

PREVAILING WINDS; BLOWING TOWARDS: ARITHMETIC MEAN: TRS
1 DIV= 10 % 1 DIV= 0.1 PPM

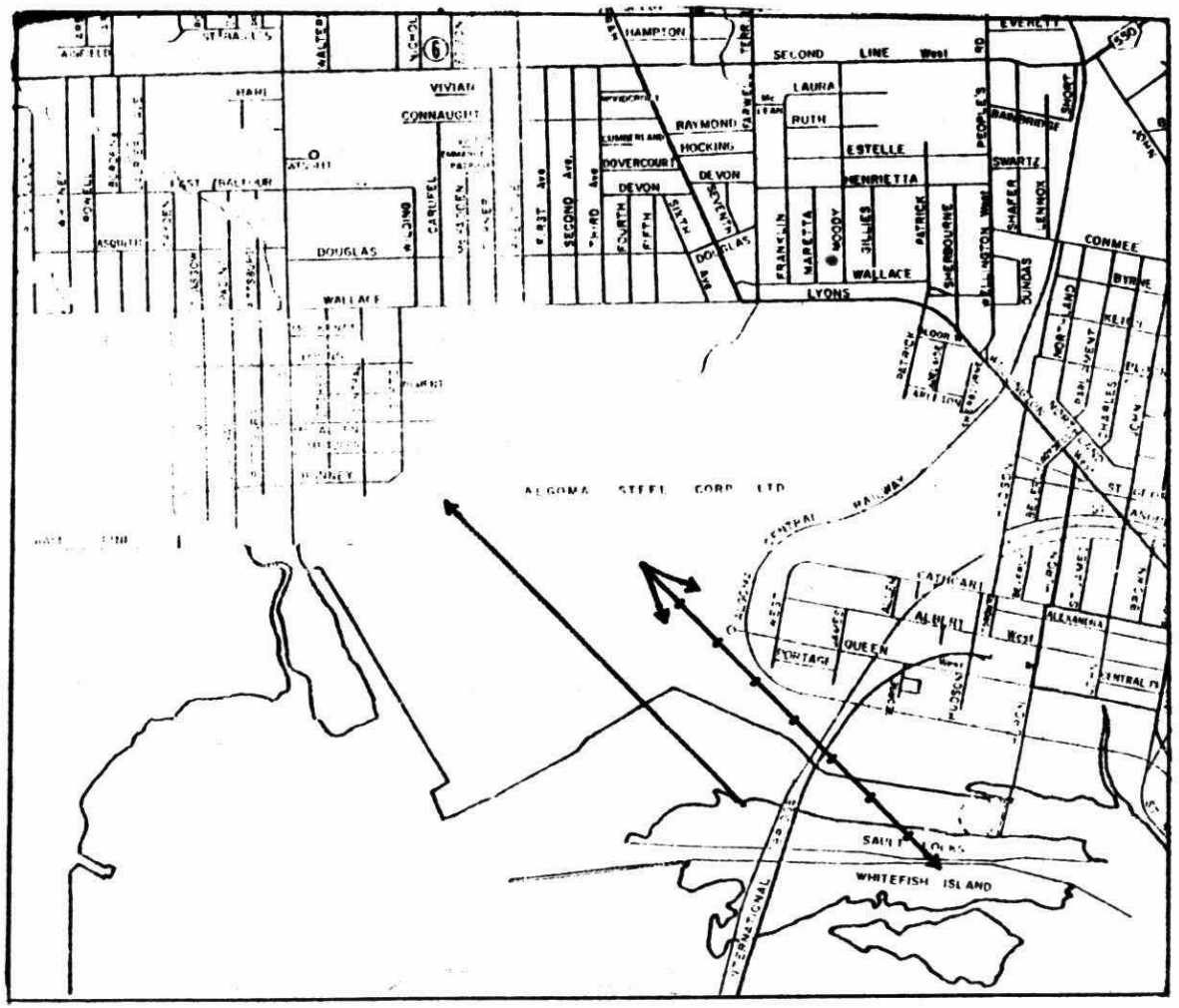


Figure 28

S.S.MARIE #27

17:45 JUL 27 1978 SCAN= 60 SEC AVE= 30 MIN
LENGTH= 4.5 HRS MINIMUM MEAN= 0.02 PPM
DELAY= 0 MIN WIND RANGE= 5 , 45 KM/HR
LOC: WHITEFISH ISLAND POINT (07023-51544); 0.7KM & 160DGS/SRC

PREVAILING WINDS; BLOWING TOWARDS: ARITHMETIC MEAN: 502
1 DIV= 10 % 1 DIV= 0.1 PPM

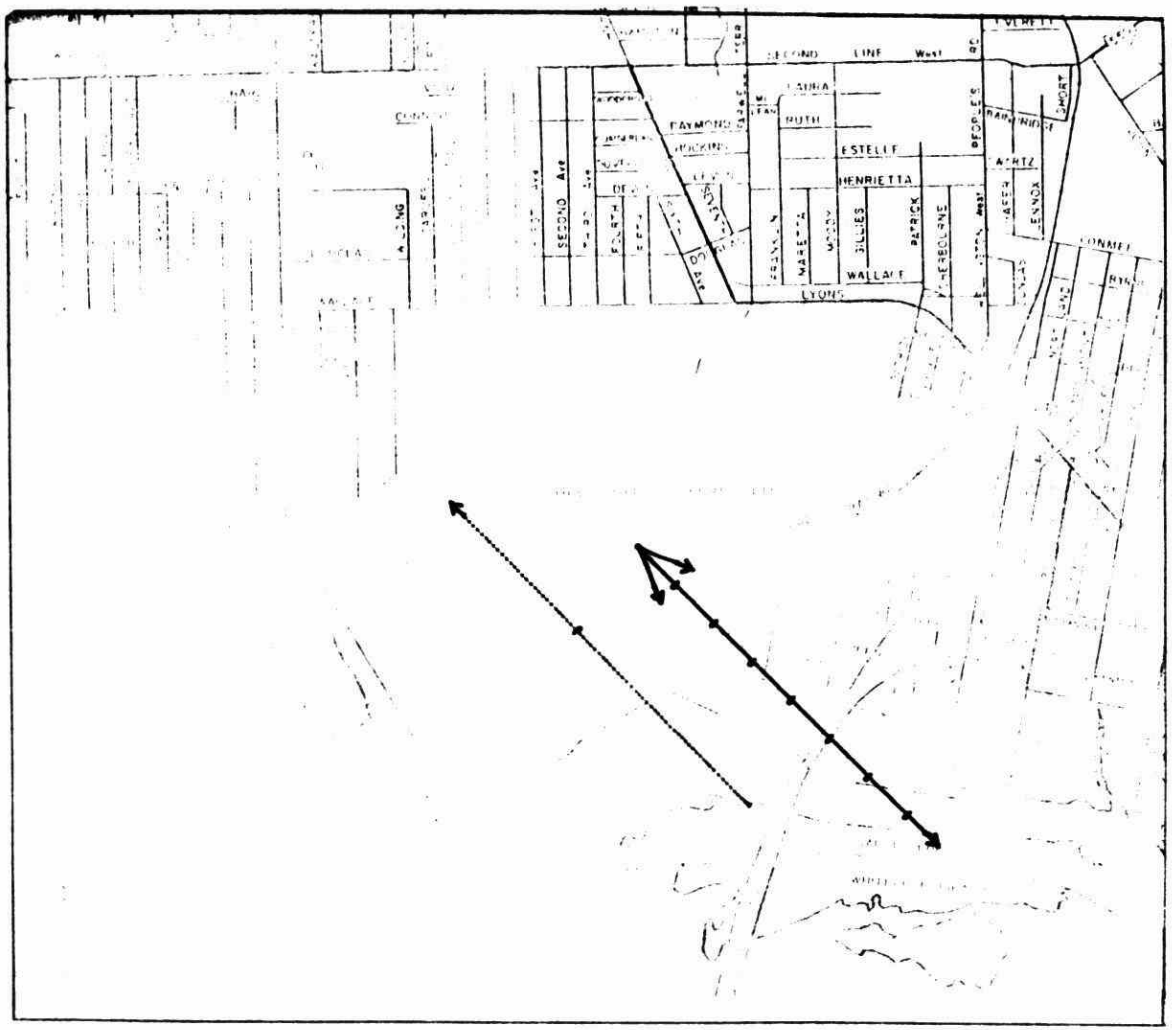
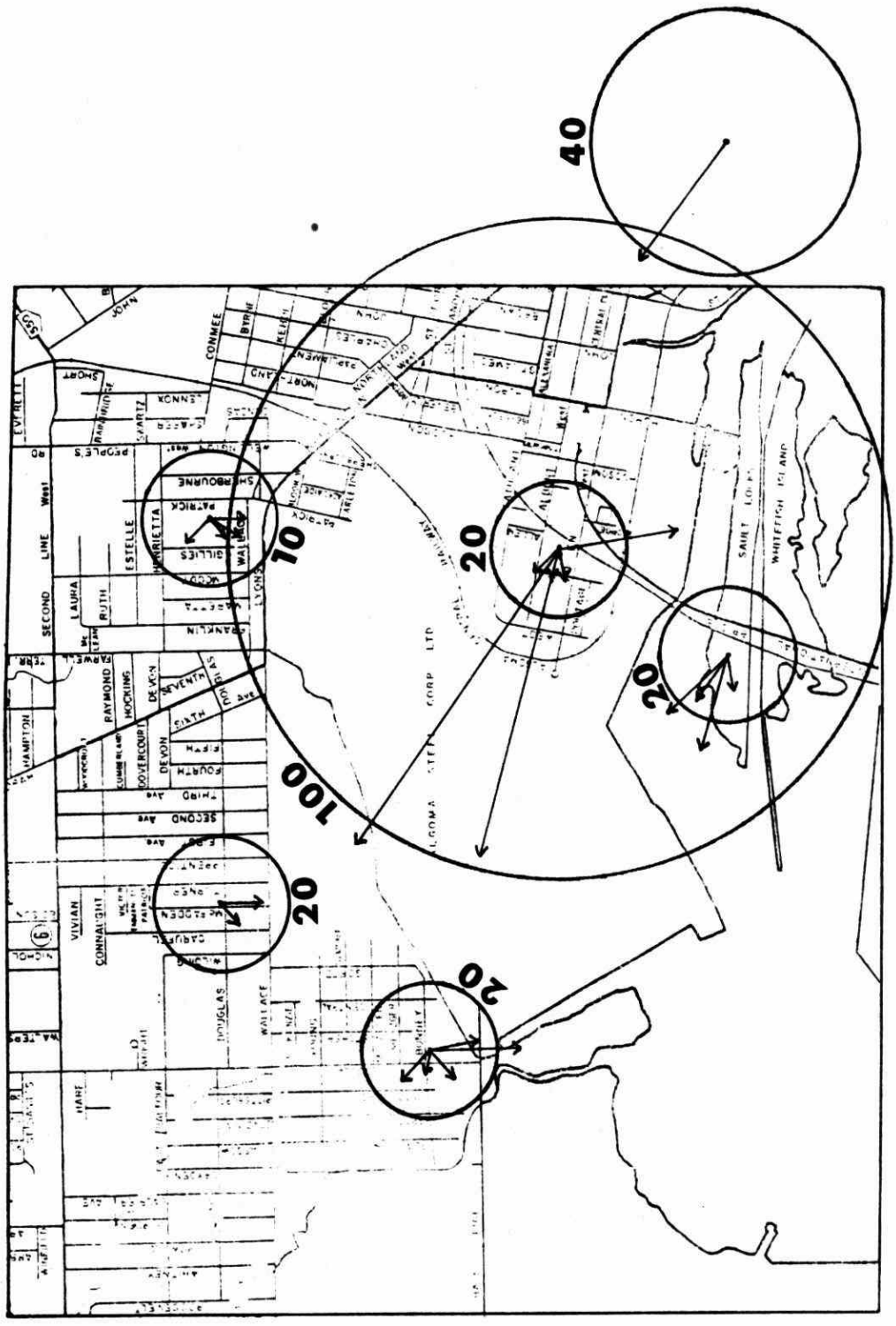


Figure 29

Figure 30

Total PAH concentration (µg/1000 m^3).

Each arrow represents a 24-hour sampling period: magnitude equals PAH concentration, direction equals average wind direction (points to sources), concentrations < 4 µg/1000 m^3 not shown.



ADDENDUM TO

ARB - TDA Report No. 14-80

REPORT ON AMBIENT AIR SURVEY

IN

SAULT STE. MARIE

1978

COMPILATION OF TIME AVERAGED DATA

The ambient air concentrations of selected gaseous pollutants and ground-level meteorological parameters as monitored by the Mobile Air Monitoring Unit in the vicinity of the Algoma Steel Corporation Limited mill in Sault Ste. Marie during July, 1978 are presented in the following statistical printouts.

All values are based on cumulative averages of continual instantaneous interrogations of the analytical instruments, and all concentrations are expressed in parts per million (ppm).

The meteorological parameters are expressed as follows:

solar radiation	-	watts/cm^2
temperature	-	degrees C
relative humidity	-	per cent (%)
barometric pressure	-	millibars (mb)
wind speed	-	km/hr
wind direction	-	degrees

The results are frequently expressed in the form:

A.B E - YX,

which has the value of A.B times 10 raised to the power (-YZ).

For example, the average concentration of H_2S (TRS) for the first 30-minute period of S.S. Marie #1 (next page) is 1.5 E-02, or 0.015 ppm.

S.S.MARIE #1

DATE: JUL 17 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION:
BONNEY ST, 0.3KM E OF GOULAIS (70110-51554); 0.9KM [illegible] 300DGS/SRC

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
23:54----00:24	1.5E-02 1.1E+00 1.3E-02 6	4.2E+00 6.9E-02 1.4E-05 63	1.9E-02 3.8E-02 19	3.4E+00 3.4E-02 993
00:09----00:39	1.0E-02 1.6E+00 1.1E-02 4	6.4E+00 1.1E-01 2.4E-05 62	2.1E-02 5.5E-02 19	5.4E+00 5.5E-02 993
00:24----00:54	7.5E-03 1.5E+00 1.3E-02 6	5.6E+00 9.6E-02 2.2E-05 63	2.2E-02 4.9E-02 18	4.6E+00 5.0E-02 993
00:39----01:09	5.9E-03 1.1E+00 1.5E-02 8	3.7E+00 6.3E-02 1.2E-05 65	2.2E-02 3.4E-02 18	2.8E+00 3.1E-02 993
00:54----01:24	4.9E-03 1.1E+00 1.6E-02 7	3.9E+00 6.0E-02 1.3E-05 66	2.2E-02 3.5E-02 18	2.7E+00 2.7E-02 993
01:09----01:39	4.0E-03 1.0E+00 2.0E-02 8	3.4E+00 4.4E-02 1.4E-05 65	2.2E-02 2.7E-02 18	2.3E+00 1.7E-02 992
01:24----01:54	3.2E-03 1.0E+00 2.0E-02 8	3.2E+00 3.9E-02 2.4E-05 66	2.2E-02 2.6E-02 18	2.3E+00 1.4E-02 993
01:39----02:09	2.7E-03 9.8E-01 1.9E-02 9	3.2E+00 4.2E-02 3.1E-05 64	2.3E-02 2.6E-02 18	2.3E+00 1.8E-02 992
01:54----02:24	2.1E-03 9.6E-01 2.0E-02 9	3.1E+00 3.8E-02 2.7E-05 63	2.3E-02 2.4E-02 18	2.2E+00 1.7E-02 992
02:09----02:39	2.1E-03 9.6E-01 2.0E-02 10	3.1E+00 4.8E-02 2.5E-05 68	2.2E-02 3.4E-02 18	2.2E+00 1.8E-02 99[illegible]

S.S.MARIE #1, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	TAC-CH4 NO BAROMETER
02:24----02:54	2.7E-03 9.9E-01 1.3E-02 9	3.3E+00 1.1E-01 2.9E-05 70	2.4E-02 4.9E-02 18	2.5E+00 6.4E-02 992
02:39----03:09	2.4E-03 1.0E+00 1.2E-02 8	3.3E+00 1.1E-01 2.8E-05 66	2.6E-02 4.2E-02 18	2.5E+00 6.4E-02 992
02:54----03:24	1.8E-03 1.0E+00 1.5E-02 9	3.5E+00 6.8E-02 1.6E-05 68	2.6E-02 4.0E-02 18	2.4E+00 3.2E-02 992
03:09----03:39	1.9E-03 1.0E+00 1.2E-02 8	3.4E+00 1.0E-01 1.8E-05 71	2.6E-02 4.4E-02 18	2.4E+00 5.5E-02 992
03:24----03:54	1.7E-03 9.7E-01 1.7E-02 8	3.3E+00 7.7E-02 2.8E-05 67	2.5E-02 2.9E-02 18	2.3E+00 4.5E-02 992
03:39----04:09	1.3E-03 9.6E-01 2.3E-02 9	3.2E+00 3.3E-02 3.2E-05 62	2.3E-02 1.8E-02 18	2.2E+00 1.6E-02 991
03:54----04:24	1.0E-03 9.4E-01 2.1E-02 10	3.0E+00 3.7E-02 3.8E-05 62	2.3E-02 2.0E-02 18	2.1E+00 2.0E-02 991
04:09----04:39	7.9E-04 9.3E-01 2.1E-02 10	3.0E+00 3.6E-02 4.0E-05 66	2.2E-02 1.8E-02 18	2.1E+00 2.1E-02 991
04:24----04:54	1.3E-03 1.0E+00 1.9E-02 8	3.6E+00 4.7E-02 4.5E-05 70	2.4E-02 3.0E-02 19	2.4E+00 2.0E-02 991
04:39----05:09	7.3E-03 1.2E+00 1.6E-02 7	4.3E+00 6.0E-02 2.8E-05 99	3.3E-02 3.7E-02 18	3.2E+00 2.7E-02 991
04:54----05:24	1.2E-02 1.1E+00 1.3E-02 10	4.0E+00 7.5E-02 1.9E-05 104	4.2E-02 3.6E-02 17	3.2E+00 4.3E-02 991

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
05:09----05:39	8.8E-03 1.0E+00 8.6E-03 8	3.4E+00 9.8E-02 3.4E-05 85	3.5E-02 3.6E-02 17	2.5E+00 5.9E-02 991
05:24----05:54	5.3E-03 9.5E-01 1.5E-02 7	3.1E+00 6.7E-02 5.7E-05 67	2.4E-02 2.5E-02 17	2.3E+00 3.8E-02 991
05:39----06:09	4.2E-03 9.4E-01 2.2E-02 8	3.1E+00 3.0E-02 1.5E-04 67	2.1E-02 1.9E-02 17	2.3E+00 1.2E-02 991
05:54----06:24	3.7E-03 9.6E-01 1.9E-02 9	3.2E+00 4.1E-02 3.4E-04 70	1.8E-02 2.7E-02 17	2.3E+00 1.6E-02 991
06:09----06:39	3.5E-03 9.6E-01 1.5E-02 9	3.2E+00 5.6E-02 8.3E-04 76	1.8E-02 3.6E-02 17	2.3E+00 2.2E-02 990
06:24----06:54	3.7E-03 9.6E-01 1.4E-02 10	3.2E+00 5.8E-02 2.0E-03 80	2.0E-02 3.5E-02 17	2.3E+00 2.4E-02 990
06:39----07:09	3.6E-03 9.7E-01 1.2E-02 9	3.4E+00 6.1E-02 2.7E-03 74	2.1E-02 3.6E-02 17	2.4E+00 2.7E-02 991
06:54----07:24	3.6E-03 9.8E-01 1.3E-02 8	3.3E+00 5.4E-02 2.3E-03 68	1.8E-02 3.3E-02 17	2.4E+00 2.6E-02 991
07:09----07:39	4.0E-03 1.0E+00 1.3E-02 8	3.7E+00 5.4E-02 1.5E-03 67	1.7E-02 3.7E-02 17	2.7E+00 2.0E-02 991
07:24----07:54	4.8E-03 1.1E+00 9.6E-03 7	3.9E+00 6.9E-02 1.2E-03 75	1.8E-02 4.5E-02 18	3.1E+00 2.5E-02 991
07:39----08:09	5.4E-03 1.0E+00 8.1E-03 6	3.7E+00 7.3E-02 1.3E-03 76	2.0E-02 4.7E-02 18	2.9E+00 2.7E-02 991

S.S.MARIE #1, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROML cK
07:54----08:24	4.8E-03 1.0E+00 8.3E-03 7	3.6E+00 6.1E-02 1.0E-03 63	1.9E-02 4.4E-02 18	2.5E+00 2.0E-02 991
08:09----08:39	4.3E-03 9.9E-01 9.2E-03 8	3.3E+00 5.2E-02 1.0E-03 60	1.6E-02 3.8E-02 17	2.6E+00 1.7E-02 991
08:24----08:54	4.6E-03 1.0E+00 7.2E-03 8	3.5E+00 1.0E-01 1.4E-03 65	1.6E-02 4.8E-02 17	2.6E+00 5.7E-02 991
08:39----09:09	4.8E-03 9.9E-01 5.5E-03 8	3.5E+00 1.2E-01 2.0E-03 70	1.6E-02 5.6E-02 17	2.4E+00 6.6E-02 99[illegible]
08:54----09:24	4.5E-03 1.1E+00 7.3E-03 8	3.5E+00 7.3E-02 2.5E-03 71	1.6E-02 4.7E-02 18	3.1E+00 3.2E-02 991

STATISTICS

NUMBER OF READINGS 574

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	4.25E-04	3.37E-02	4.67E-03	3.95E-03	3.58E-03	2.03E+00
THC	2.94E+00	2.05E+01	3.58E+00	1.52E+00	3.44E+00	1.37E+00
SO2	1.24E-02	5.82E-02	2.21E-02	6.03E-03	2.15E-02	1.26E+00
THC-CH4	1.70E+00	1.78E+01	2.66E+00	1.58E+00	2.48E+00	1.36E+00
CH4	8.99E-01	4.57E+00	1.04E+00	2.80E-01	1.02E+00	1.19E+00
NOX	2.29E-02	4.12E-01	6.60E-02	4.78E-02	5.61E-02	1.69E+00
NO2	1.00E-06	2.08E-01	3.58E-02	2.55E-02	2.34E-02	5.37E+00
NO	7.94E-03	2.70E-01	3.18E-02	3.58E-02	2.31E-02	2.04E+00
OZONE	3.40E-04	2.61E-02	1.43E-02	6.22E-03	1.24E-02	1.85E+00
SOLAR RAD	1.00E-06	3.16E-03	5.99E-04	9.05E-04	9.52E-05	8.38E+00
TEMP	16	19	18	1		
BAROMETER	990	993	992	1	992	1
WIND SPEED	0	19	8	3	8	2

S.S.MARIE #5

DATE: JUL 20 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: SAULT LOCK (70250-51543); 0.9KM & 140DGS/SRC

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
10:24----10:54	2.0E-02 1.7E+00 1.1E-02 15	4.2E+00 5.2E-02 2.2E-02 303	6.6E-02 2.6E-02 16	2.2E+00 2.9E-02 996
10:34----11:04	1.4E-02 1.8E+00 9.0E-03 14	4.3E+00 6.2E-02 2.0E-02 300	7.6E-02 2.9E-02 16	2.3E+00 3.6E-02 996
10:44----11:14	1.2E-02 1.8E+00 8.4E-03 14	4.3E+00 6.8E-02 1.9E-02 298	9.4E-02 2.8E-02 16	2.3E+00 4.0E-02 996
10:54----11:24	1.1E-02 1.8E+00 9.1E-03 13	4.3E+00 6.6E-02 1.8E-02 304	9.8E-02 2.6E-02 16	2.2E+00 3.9E-02 996
11:04----11:34	9.7E-03 1.8E+00 1.0E-02 13	4.1E+00 6.0E-02 1.8E-02 300	9.9E-02 2.8E-02 16	2.2E+00 3.4E-02 996
11:14----11:44	7.2E-03 1.7E+00 1.0E-02 11	4.1E+00 6.0E-02 1.8E-02 297	8.6E-02 3.0E-02 16	2.2E+00 3.3E-02 997
11:24----11:54	5.8E-03 1.8E+00 1.0E-02 11	4.1E+00 6.0E-02 1.9E-02 292	8.1E-02 2.9E-02 16	2.5E+00 3.3E-02 997
11:34----12:04	5.6E-03 1.8E+00 1.0E-02 11	4.2E+00 5.8E-02 2.0E-02 295	7.3E-02 2.5E-02 16	2.6E+00 3.5E-02 997
11:44----12:14	5.8E-03 1.8E+00 1.1E-02 10	4.2E+00 5.9E-02 2.2E-02 298	8.9E-02 2.6E-02 16	2.5E+00 3.5E-02 997
11:54----12:24	6.4E-03 1.7E+00 1.0E-02 10	4.2E+00 6.7E-02 2.8E-02 303	1.2E-01 3.0E-02 17	2.2E+00 3.9E-02 997

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
12:04----12:34	6.3E-03 1.7E+00 1.0E-02 10	4.1E+00 7.1E-02 3.4E-02 306	1.5E-01 3.2E-02 17	2.2E+00 4.1E-02 997

STATISTICS

NUMBER OF READINGS 132

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	3.75E-03	3.64E-02	1.04E-02	6.93E-03	8.76E-03	1.74E+00
THC	3.90E+00	7.87E+00	4.20E+00	3.74E-01	4.19E+00	1.07E+00
SO2	4.33E-02	2.10E-01	9.71E-02	3.99E-02	8.97E-02	1.48E+00
THC-CH4	2.01E+00	1.37E+01	2.29E+00	1.01E+00	2.23E+00	1.18E+00
CH4	1.71E+00	2.50E+00	1.75E+00	6.82E-02	1.75E+00	1.03E+00
NOX	2.36E-02	1.02E-01	6.15E-02	1.81E-02	5.88E-02	1.36E+00
NO2	1.00E-06	6.75E-02	2.76E-02	1.34E-02	1.98E-02	5.01E+00
NO	1.21E-02	7.31E-02	3.54E-02	1.29E-02	3.30E-02	1.48E+00
OZONE	4.59E-03	1.75E-02	1.03E-02	2.88E-03	9.84E-03	1.35E+00
SOLAR RAD	1.51E-02	4.33E-02	2.34E-02	7.60E-03	2.24E-02	1.33E+00
TEMP	16	18	16	1		
BAROMETER	996	997	996	0	996	1
WIND SPEED	5	24	12	4	12	1

S.S.MARIE #6

DATE: JUL 20 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: CENTRAL PARK (70380-51548); 1.2KM & 100DGS/SRC - CO NO GOOD

TIME	CO THC-CH4 NO BAROMETER	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP
13:10----13:40	2.2E+01 2.2E+00 2.2E-02 998	1.4E-03 1.7E+00 2.0E-02 8	4.3E+00 3.6E-02 5.2E-02 304	2.0E-02 1.8E-02 20
13:15----13:45	2.2E+01 2.1E+00 1.8E-02 998	1.3E-03 1.7E+00 2.0E-02 9	4.2E+00 3.2E-02 5.3E-02 301	1.8E-02 1.5E-02 20
13:20----13:50	2.2E+01 2.2E+00 1.8E-02 998	1.2E-03 1.7E+00 2.0E-02 9	4.3E+00 3.0E-02 5.4E-02 304	1.7E-02 1.4E-02 20
13:25----13:55	2.3E+01 2.2E+00 1.8E-02 998	1.1E-03 1.7E+00 2.0E-02 9	4.3E+00 3.2E-02 5.5E-02 304	1.6E-02 1.6E-02 21
13:30----14:00	2.4E+01 2.6E+00 1.9E-02 998	1.0E-03 1.7E+00 2.0E-02 8	4.4E+00 3.2E-02 5.7E-02 308	1.5E-02 1.6E-02 21
13:35----14:05	2.3E+01 2.8E+00 2.5E-02 998	1.0E-03 1.7E+00 2.0E-02 8	4.6E+00 3.7E-02 5.9E-02 308	1.5E-02 1.5E-02 21
13:40----14:10	2.4E+01 2.8E+00 2.6E-02 998	9.8E-04 1.8E+00 2.0E-02 8	4.5E+00 3.9E-02 6.6E-02 303	1.5E-02 1.6E-02 22

STATISTICS

NUMBER OF READINGS 62

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
CO	1.73E+01	4.13E+01	2.30E+01	4.06E+00	2.27E+01	1.17E+00
H2S	7.09E-04	1.98E-03	1.22E-03	3.10E-04	1.18E-03	1.30E+00
THC	3.91E+00	1.07E+01	4.39E+00	1.08E+00	4.30E+00	1.19E+00
SO2	1.21E-02	3.15E-02	1.76E-02	3.99E-03	1.72E-02	1.23E+00
THC-CH4	2.02E+00	1.31E+01	2.50E+00	1.58E+00	2.33E+00	1.35E+00
CH4	1.68E+00	2.29E+00	1.74E+00	8.80E-02	1.74E+00	1.05E+00
NOX	2.00E-02	1.14E-01	3.76E-02	1.73E-02	3.52E-02	1.40E+00
NO2	1.00E-06	1.19E-01	1.69E-02	1.73E-02	3.84E-03	3.32E+01
NO	8.59E-03	8.60E-02	2.36E-02	1.68E-02	2.00E-02	1.71E+00
OZONE	1.43E-02	2.38E-02	1.98E-02	1.90E-03	1.97E-02	1.11E+00
SOLAR RAD	4.47E-02	1.04E-01	5.95E-02	1.37E-02	5.82E-02	1.22E+00
TEMP	19	23	21	1		
BAROMETER	997	998	998	0	998	1
WIND SPEED	3	15	9	3	8	1

S.S.MARIE #8

DATE: JUL 20 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION:
PORTAGE LANE & JAMES ST (70280-51548); 0.9KM & 100DGS/SRC - CO OK

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
16:07----16:37	7.8E-03 1.0E-06 2.4E-02 11	1.0E-06 3.2E-02 5.3E-02 322	1.4E-02 2.2E-02 24	1.0E-06 1.2E-02 996
16:17----16:47	7.6E-03 5.5E-01 2.3E-02 10	1.4E+00 4.0E-02 5.4E-02 321	2.2E-02 2.5E-02 24	9.0E-01 1.9E-02 996
16:27----16:57	7.0E-03 1.1E+00 2.3E-02 10	2.8E+00 4.1E-02 5.0E-02 315	2.5E-02 2.4E-02 24	1.6E+00 1.9E-02 996
16:37----17:07	5.9E-03 1.7E+00 2.4E-02 11	4.1E+00 3.1E-02 4.0E-02 311	2.4E-02 1.7E-02 24	2.3E+00 1.7E-02 996
16:47----17:17	4.3E-03 1.7E+00 2.4E-02 13	4.0E+00 2.5E-02 3.3E-02 309	1.8E-02 1.5E-02 23	2.1E+00 1.2E-02 996
16:57----17:27	3.8E-03 1.7E+00 2.3E-02 13	4.0E+00 2.6E-02 3.4E-02 311	1.8E-02 1.7E-02 22	2.1E+00 1.1E-02 996
17:07----17:37	3.4E-03 1.7E+00 2.0E-02 14	4.0E+00 3.4E-02 4.0E-02 319	1.7E-02 1.9E-02 23	2.1E+00 1.8E-02 996
17:17----17:47	3.2E-03 1.7E+00 1.9E-02 14	4.0E+00 3.8E-02 4.4E-02 323	1.6E-02 1.9E-02 22	2.1E+00 2.0E-02 996
17:27----17:57	3.0E-03 1.7E+00 2.0E-02 15	3.9E+00 3.6E-02 3.9E-02 327	1.4E-02 1.7E-02 22	2.0E+00 1.9E-02 996
17:37----18:07	2.7E-03 1.8E+00 2.2E-02 15	4.0E+00 2.6E-02 3.2E-02 328	1.2E-02 1.4E-02 22	2.0E+00 1.2E-02 996

S.S.MARIE #8, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
17:47----18:17	2.3E-03 1.8E+00 2.3E-02 15	3.9E+00 1.6E-02 2.9E-02 329	1.0E-02 9.9E-03 21	2.0E+00 6.8E-03 996

STATISTICS

NUMBER OF READINGS 134

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.46E-03	1.28E-02	4.64E-03	2.56E-03	4.05E-03	1.68E+00
THC	1.00E-06	8.31E+00	3.11E+00	1.73E+00	1.33E-01	5.78E+02
SO2	7.44E-03	5.24E-02	1.60E-02	8.27E-03	1.45E-02	1.51E+00
THC-CH4	1.00E-06	8.46E+00	1.64E+00	1.05E+00	8.01E-02	4.41E+02
CH4	1.00E-06	2.05E+00	1.34E+00	7.31E-01	6.92E-02	4.97E+02
NOX	1.22E-02	9.55E-02	2.92E-02	1.83E-02	2.52E-02	1.66E+00
NO2	1.00E-06	9.37E-02	1.70E-02	1.30E-02	1.10E-02	5.72E+00
NO	4.99E-03	6.89E-02	1.38E-02	1.14E-02	1.12E-02	1.70E+00
OZONE	1.26E-02	2.81E-02	2.26E-02	4.01E-03	2.21E-02	1.22E+00
SOLAR RAD	1.57E-02	6.83E-02	3.99E-02	1.35E-02	3.75E-02	1.43E+00
TEMP	20	26	23	1		
BAROMETER	996	997	996	0	996	1
WIND SPEED	2	21	13	4	12	1

S.S.MARIE #10

DATE: JUL 20 1978
SCAN TIME: 150 SEC
AVERAGING TIME: 30 MIN
LOCATION: WEST TIP SAULT LOCKS (70215-51542); 0.8KM & 170DGS/SRC

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
23:10----23:40	3.7E-03 1.7E+00 1.1E-02 10	4.0E+00 4.2E-02 3.8E-06 293	1.7E-02 2.4E-02 16	2.1E+00 2.1E-02 997
23:25----23:55	4.7E-03 1.7E+00 6.2E-03 12	4.0E+00 8.7E-02 9.2E-06 300	1.3E-02 3.6E-02 16	2.1E+00 5.2E-02 997
23:40----00:10	3.8E-03 1.7E+00 4.6E-03 13	3.9E+00 1.0E-01 1.7E-05 305	8.2E-03 3.5E-02 15	2.0E+00 6.4E-02 997
23:55----00:25	3.7E-03 1.7E+00 4.3E-03 10	3.9E+00 9.7E-02 2.3E-05 303	8.9E-03 2.5E-02 16	2.0E+00 6.5E-02 997
00:10----00:40	3.5E-03 1.7E+00 8.7E-03 5	3.8E+00 6.9E-02 2.0E-05 264	8.8E-03 2.0E-02 16	2.0E+00 4.4E-02 997
00:25----00:55	3.0E-03 1.7E+00 1.3E-02 4	3.8E+00 2.1E-02 1.5E-05 228	7.9E-03 1.4E-02 16	1.9E+00 8.3E-03 997
00:40----01:10	2.5E-03 1.7E+00 1.3E-02 2	4.1E+00 2.2E-02 1.5E-05 246	8.1E-03 1.5E-02 16	2.3E+00 8.7E-03 997
00:55----01:25	2.2E-03 1.8E+00 1.3E-02 0	4.5E+00 2.1E-02 1.7E-05 291	9.2E-03 1.1E-02 16	2.8E+00 1.1E-02 996
01:10----01:40	2.4E-03 1.8E+00 7.5E-03 0	5.7E+00 4.2E-02 2.1E-05 12	1.0E-02 3.0E-02 17	3.6E+00 1.7E-02 996
01:25----01:55	2.3E-03 1.8E+00 5.3E-03 1	6.8E+00 6.0E-02 1.5E-05 331	1.1E-02 3.7E-02 17	3.8E+00 3.1E-02 996

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
01:40----02:10	2.3E-03 1.8E+00 6.5E-03 2	5.5E+00 4.9E-02 8.5E-06 336	9.6E-03 2.6E-02 16	2.7E+00 2.9E-02 996
01:55----02:25	2.2E-03 1.8E+00 6.2E-03 4	4.2E+00 3.9E-02 8.1E-06 16	5.1E-03 2.2E-02 16	2.3E+00 1.9E-02 996
02:10----02:40	2.4E-03 1.9E+00 4.5E-03 2	4.4E+00 5.5E-02 8.7E-06 36	2.8E-03 2.4E-02 16	2.3E+00 3.4E-02 996
02:25----02:55	3.3E-03 1.9E+00 1.8E-03 0	6.1E+00 7.9E-02 1.8E-05 154	3.0E-03 2.8E-02 16	3.8E+00 5.6E-02 995
02:40----03:10	2.7E-03 1.9E+00 2.2E-03 0	6.9E+00 9.2E-02 2.8E-05 42	3.3E-03 2.7E-02 17	4.1E+00 7.9E-02 995
02:55----03:25	1.6E-03 1.8E+00 3.3E-03 2	5.0E+00 7.8E-02 2.3E-05 196	3.0E-03 2.2E-02 17	2.6E+00 6.4E-02 995
03:10----03:40	1.3E-03 1.8E+00 4.0E-03 4	3.9E+00 4.7E-02 1.4E-05 224	3.4E-03 1.8E-02 16	2.0E+00 2.9E-02 995
03:25----03:55	1.0E-03 1.7E+00 4.1E-03 7	3.8E+00 3.4E-02 9.2E-06 256	4.2E-03 1.6E-02 16	1.9E+00 1.8E-02 995
03:40----04:10	1.3E-03 1.7E+00 6.3E-03 11	3.7E+00 2.4E-02 5.8E-06 276	5.1E-03 1.3E-02 15	1.9E+00 1.2E-02 995
03:55----04:25	2.3E-03 1.7E+00 6.8E-03 11	3.8E+00 2.6E-02 3.4E-06 284	6.3E-03 1.4E-02 15	2.0E+00 1.3E-02 995
04:10----04:40	2.3E-03 1.8E+00 3.0E-03 5	4.6E+00 5.6E-02 3.4E-06 286	7.3E-03 2.2E-02 16	2.3E+00 3.5E-02 995

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
04:25----04:55	2.1E-03 1.9E+00 3.7E-04 1	5.8E+00 9.7E-02 4.4E-06 296	6.6E-03 3.5E-02 16	3.4E+00 6.2E-02 995
04:40----05:10	2.4E-03 2.0E+00 1.7E-04 0	7.3E+00 1.6E-01 4.2E-06 65	8.4E-03 3.4E-02 16	5.1E+00 1.2E-01 995
04:55----05:25	1.8E-03 1.9E+00 1.7E-04 0	7.1E+00 1.8E-01 3.0E-06 75	1.2E-03 3.0E-02 16	4.4E+00 1.4E-01 995
05:10----05:40	1.6E-03 1.9E+00 2.0E-04 0	6.7E+00 1.4E-01 9.9E-06 317	1.2E-03 3.2E-02 16	3.7E+00 1.0E-01 995
05:25----05:55	1.6E-03 1.9E+00 1.7E-03 3	5.9E+00 9.1E-02 2.9E-05 283	1.4E-03 2.3E-02 15	3.4E+00 6.4E-02 995
05:40----06:10	2.0E-03 1.8E+00 4.3E-03 5	4.1E+00 4.2E-02 1.0E-04 278	1.8E-03 1.3E-02 15	2.1E+00 2.8E-02 995
05:55----06:25	2.1E-03 1.7E+00 5.1E-03 3	3.9E+00 2.7E-02 4.1E-04 259	3.1E-03 1.0E-02 15	2.0E+00 1.6E-02 995
06:10----06:40	1.9E-03 1.7E+00 5.0E-03 3	3.8E+00 2.3E-02 1.5E-03 264	4.3E-03 1.1E-02 15	2.0E+00 1.3E-02 995
06:25----06:55	1.9E-03 1.8E+00 4.9E-03 5	4.0E+00 2.1E-02 3.2E-03 284	5.4E-03 1.0E-02 15	2.1E+00 1.1E-02 995
06:40----07:10	2.9E-03 1.8E+00 5.4E-03 5	4.0E+00 1.9E-02 3.7E-03 283	6.9E-03 9.1E-03 15	2.0E+00 1.1E-02 995
06:55----07:25	2.9E-03 1.7E+00 6.8E-03 5	3.8E+00 1.6E-02 4.0E-03 276	7.4E-03 6.8E-03 15	1.9E+00 9.5E-03 995

S.S.MARIE #10, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
07:10----07:40	1.3E-03 1.7E+00 7.8E-03 4	3.7E+00 1.5E-02 6.3E-03 269	5.4E-03 5.9E-03 15	1.9E+00 9.0E-03 996
07:25----07:55	5.6E-04 1.7E+00 8.4E-03 5	3.7E+00 1.5E-02 9.0E-03 260	3.4E-03 5.8E-03 15	1.9E+00 8.8E-03 996
07:40----08:10	2.6E-04 1.7E+00 8.5E-03 7	3.7E+00 1.4E-02 1.1E-02 256	3.4E-03 5.6E-03 15	1.8E+00 8.4E-03 996
07:55----08:25	9.5E-05 1.7E+00 8.6E-03 7	3.7E+00 1.4E-02 1.4E-02 260	4.6E-03 5.8E-03 16	1.8E+00 7.9E-03 996
08:10----08:40	1.2E-05 1.7E+00 9.0E-03 7	3.7E+00 1.5E-02 1.6E-02 260	6.1E-03 7.2E-03 16	1.8E+00 8.3E-03 996
08:25----08:55	2.3E-05 1.7E+00 9.4E-03 6	3.6E+00 1.8E-02 1.7E-02 254	7.6E-03 8.7E-03 16	1.8E+00 9.4E-03 996
08:40----09:10	3.4E-05 1.7E+00 9.9E-03 6	3.6E+00 1.9E-02 2.0E-02 255	6.7E-03 9.8E-03 17	1.8E+00 1.0E-02 996
08:55----09:25	8.1E-05 1.7E+00 1.1E-02 7	3.6E+00 2.0E-02 2.1E-02 261	4.1E-03 9.7E-03 17	1.8E+00 1.1E-02 996

STATISTICS

NUMBER OF READINGS 250

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.00E-06	7.57E-03	1.95E-03	1.44E-03	8.52E-04	9.35E+00
THC	3.62E+00	1.99E+01	4.53E+00	2.18E+00	4.29E+00	1.33E+00
SO2	1.00E-06	2.14E-02	6.00E-03	4.03E-03	3.73E-03	5.37E+00
THC-CH4	1.82E+00	1.54E+01	2.47E+00	1.77E+00	2.25E+00	1.41E+00
CH4	1.66E+00	2.60E+00	1.78E+00	1.29E-01	1.77E+00	1.07E+00
NOX	1.30E-02	4.11E-01	5.08E-02	5.03E-02	3.58E-02	2.21E+00
NO2	1.00E-06	1.30E-01	1.85E-02	1.73E-02	9.68E-03	2.09E+00
NO	6.61E-03	3.77E-01	3.30E-02	4.26E-02	2.00E-02	2.51E+00
OZONE	5.50E-05	1.65E-02	6.26E-03	4.23E-03	3.80E-03	3.81E+00
SOLAR RAD	1.00E-06	2.45E-02	3.64E-03	6.67E-03	8.47E-05	2.86E+01
TEMP	15	17	16	1		
BAROMETER	995	997	996	1	996	1
WIND SPEED	0	16	5	4	1	18

S.S.MARIE #11

DATE: JUL 21 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: WALLACE TERR RD & WILDING AV (70200-51558); 1.5KM & 360DGS/SRC

TIME	H2S CH4 OZONE BAROMETER	THC NOX SOLAR RAD WIND SPEED	SO2 NO2 TEMP WIND DIRECTION	THC-CH4 NO HUMIDITY
11:00----11:30	6.9E-03 5.7E+01 1.4E-02 995	6.1E+00 8.2E-02 6.1E-02 1	2.1E-02 3.4E-02 29 210	3.2E+00 5.3E-02 62
11:10----11:40	6.3E-03 5.3E+01 1.6E-02 995	6.2E+00 7.6E-02 5.8E-02 1	2.1E-02 2.9E-02 30 200	3.0E+00 5.3E-02 57
11:20----11:50	5.7E-03 4.6E+01 1.8E-02 995	6.6E+00 7.7E-02 5.2E-02 1	1.9E-02 2.8E-02 30 187	3.2E+00 5.4E-02 58
11:30----12:00	5.7E-03 4.0E+01 1.9E-02 995	6.0E+00 8.5E-02 5.0E-02 1	2.0E-02 3.8E-02 29 192	2.9E+00 5.1E-02 60

STATISTICS

NUMBER OF READINGS 66

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	4.70E-03	7.76E-03	6.28E-03	8.36E-04	6.22E-03	1.14E+00
THC	3.33E+00	2.40E+01	6.11E+00	3.99E+00	5.29E+00	1.64E+00
SO2	1.41E-02	2.74E-02	2.03E-02	3.50E-03	2.00E-02	1.19E+00
THC-CH4	1.53E+00	1.11E+01	3.00E+00	2.14E+00	2.52E+00	1.72E+00
CH4	1.37E+01	9.12E+01	4.69E+01	1.33E+01	4.47E+01	1.39E+00
NOX	3.67E-02	1.87E-01	8.45E-02	3.25E-02	7.90E-02	1.44E+00
NO2	1.00E-06	1.68E-01	3.60E-02	3.07E-02	8.94E-03	3.29E+01
NO	1.76E-02	1.31E-01	5.18E-02	2.67E-02	4.60E-02	1.63E+00
OZONE	1.08E-02	2.39E-02	1.66E-02	3.37E-03	1.63E-02	1.23E+00
SOLAR RAD	1.50E-02	8.57E-02	5.43E-02	2.21E-02	4.88E-02	1.65E+00
TEMP	26	31	29	1		
HUMIDITY	51	79	62	7	61	1
BAROMETER	994	996	995	0	995	1
WIND SPEED	0	5	2	1	1	10

S.S.MARIE #12

DATE: JUL 21 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: WALLACE TERR RD & WILDING AV (70200-51558): 1.5KM & 360DGS/SRC

TIME	H2S / CH4 / OZONE / BAROMETER	THC / NOX / SOLAR RAD / WIND SPEED	SO2 / NO2 / TEMP / WIND DIRECTION	THC-CH4 / NO / HUMIDITY
12:15----12:45	9.2E-03 9.8E+00 1.3E-02 994	5.0E+00 1.3E-01 7.0E-02 5	3.7E-02 6.5E-02 29 224	2.3E+00 7.3E-02 65
12:25----12:55	9.7E-03 1.4E+00 1.4E-02 994	5.0E+00 1.4E-01 7.4E-02 5	3.4E-02 6.2E-02 29 218	2.6E+00 7.8E-02 65
12:35----13:05	9.5E-03 2.6E-06 1.9E-02 994	4.3E+00 1.0E-01 7.4E-02 4	3.0E-02 4.7E-02 29 195	2.2E+00 5.5E-02 66
12:45----13:15	9.2E-03 2.6E-06 2.1E-02 994	4.5E+00 8.4E-02 6.8E-02 4	2.9E-02 3.7E-02 28 183	2.4E+00 4.6E-02 67
12:55----13:25	8.7E-03 2.6E-06 2.4E-02 994	4.0E+00 6.6E-02 4.9E-02 5	2.5E-02 2.9E-02 28 216	2.0E+00 3.5E-02 70
13:05----13:35	8.4E-03 2.6E-06 2.4E-02 994	4.0E+00 6.8E-02 2.9E-02 6	1.9E-02 2.7E-02 26 237	2.0E+00 3.9E-02 75
13:15----13:45	8.0E-03 2.6E-06 2.5E-02 994	4.2E+00 7.2E-02 3.0E-02 6	1.6E-02 2.5E-02 26 243	2.0E+00 5.0E-02 79

STATISTICS

NUMBER OF READINGS 92

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	7.29E-03	1.19E-02	8.78E-03	1.04E-03	8.72E-03	1.12E+00
THC	3.14E+00	1.68E+01	4.54E+00	2.48E+00	4.18E+00	1.43E+00
SO2	1.20E-02	5.04E-02	2.69E-02	9.88E-03	2.51E-02	1.46E+00
THC-CH4	1.51E+00	7.97E+00	2.21E+00	1.27E+00	2.02E+00	1.45E+00
CH4	1.00E-06	4.12E+01	3.20E+00	8.47E+00	1.72E-05	5.16E+02
NOX	3.25E-02	3.16E-01	9.50E-02	4.77E-02	8.55E-02	1.57E+00
NO2	1.00E-06	2.49E-01	4.18E-02	3.93E-02	1.14E-02	2.87E+01
NO	1.89E-02	2.34E-01	5.62E-02	3.42E-02	4.92E-02	1.64E+00
OZONE	7.56E-03	3.03E-02	2.01E-02	6.52E-03	1.89E-02	1.45E+00
SOLAR RAD	1.14E-02	7.92E-02	5.63E-02	2.56E-02	4.68E-02	2.03E+00
TEMP	24	29	28	2		
HUMIDITY	62	85	70	7	70	1
BAROMETER	994	994	994	0	994	1
WIND SPEED	1	13	5	3	5	2

S.S.MARIE #13

DATE: JUL 21 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: MERRIFIELD P.S. (70208-51567); 1.9KM & 045DGS/SRC

TIME				
	H2S	THC	SO2	THC-CH4
	CH4	NOX	NO2	NO
	OZONE	SOLAR RAD	TEMP	HUMIDITY
	BAROMETER	WIND SPEED	WIND DIRECTION	
14:31----15:01	5.8E-03	3.1E+00	1.0E-02	1.5E+00
	8.0E-01	2.3E-02	1.4E-02	1.1E-02
	3.6E-02	6.0E-02	28	73
	994	8	278	
14:41----15:11	5.4E-03	3.1E+00	8.8E-03	1.4E+00
	1.5E+00	1.8E-02	8.7E-03	9.6E-03
	3.2E-02	6.7E-02	29	67
	994	9	294	
14:51----15:21	5.1E-03	3.0E+00	7.7E-03	1.4E+00
	2.3E+00	1.7E-02	8.2E-03	8.9E-03
	2.8E-02	6.5E-02	29	67
	994	10	303	
15:01----15:31	4.9E-03	3.0E+00	6.4E-03	1.4E+00
	2.1E+00	1.7E-02	7.8E-03	8.9E-03
	2.7E-02	7.0E-02	29	64
	994	11	311	

STATISTICS

NUMBER OF READINGS 60

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	4.59E-03	6.49E-03	5.37E-03	5.47E-04	5.34E-03	1.11E+00
THC	2.92E+00	3.81E+00	3.04E+00	1.30E-01	3.04E+00	1.04E+00
SO2	3.76E-03	1.22E-02	8.19E-03	2.21E-03	7.86E-03	1.35E+00
THC-CH4	1.38E+00	1.61E+00	1.44E+00	4.14E-02	1.44E+00	1.03E+00
CH4	1.00E-06	8.90E+00	1.43E+00	2.37E+00	3.68E-04	1.51E+03
NOX	1.44E-02	6.69E-02	2.01E-02	9.12E-03	1.90E-02	1.33E+00
NO2	1.00E-06	6.78E-02	1.10E-02	1.06E-02	7.87E-03	3.76E+00
NO	6.36E-03	2.67E-02	9.69E-03	3.95E-03	9.22E-03	1.33E+00
OZONE	2.48E-02	4.39E-02	3.14E-02	6.23E-03	3.09E-02	1.21E+00
SOLAR RAD	2.23E-02	9.02E-02	6.48E-02	1.66E-02	6.21E-02	1.38E+00
TEMP	25	31	28	2		
HUMIDITY	57	85	68	8	68	1
BAROMETER	994	996	994	0	994	1
WIND SPEED	3	16	10	3	9	1

S.S.MARIE #14

DATE: JUL 21 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: NORTH SHORE SAULT LOCKS (70240-51544); 0.6KM & 135DGS/SRC

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
16:04----16:34	5.2E-03 2.7E-01 2.7E-02 8	3.7E+00 3.7E-02 3.4E-02 290	5.2E-03 2.0E-02 25	1.9E+00 2.0E-02 994
16:14----16:44	5.8E-03 2.7E-01 2.1E-02 12	3.8E+00 4.7E-02 3.1E-02 317	1.0E-02 2.4E-02 24	1.9E+00 2.6E-02 994
16:24----16:54	6.1E-03 1.3E-06 1.5E-02 18	3.4E+00 5.8E-02 3.8E-02 329	2.3E-02 2.2E-02 23	1.7E+00 3.7E-02 994
16:34----17:04	7.6E-03 1.3E-06 1.1E-02 22	3.3E+00 7.1E-02 4.2E-02 329	4.1E-02 2.7E-02 23	1.5E+00 4.4E-02 994
16:44----17:14	8.5E-03 1.3E-06 9.2E-03 21	3.2E+00 8.2E-02 4.3E-02 329	6.4E-02 2.8E-02 22	1.5E+00 5.2E-02 994
16:54----17:24	1.0E-02 1.3E-06 8.5E-03 18	3.3E+00 8.5E-02 3.6E-02 329	8.2E-02 3.3E-02 22	1.6E+00 5.1E-02 994
17:04----17:34	1.1E-02 1.3E-06 8.4E-03 15	3.3E+00 7.7E-02 2.9E-02 335	8.5E-02 3.4E-02 22	1.6E+00 4.4E-02 994
17:14----17:44	1.0E-02 1.3E-06 9.1E-03 15	3.3E+00 6.5E-02 2.8E-02 342	7.6E-02 3.2E-02 22	1.6E+00 3.7E-02 994
17:24----17:54	9.5E-03 1.3E-06 8.8E-03 15	3.3E+00 6.3E-02 2.5E-02 339	7.1E-02 2.9E-02 22	1.6E+00 3.7E-02 994
17:34----18:04	8.3E-03 1.3E-06 7.7E-03 15	3.3E+00 6.5E-02 2.1E-02 338	7.2E-02 2.7E-02 21	1.6E+00 4.0E-02 993

S.S.MARIE #14, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
17:44----18:14	8.0E-03 1.3E-06 7.4E-03 12	3.3E+00 6.5E-02 1.7E-02 339	7.3E-02 2.8E-02 21	1.6E+00 3.8E-02 993
17:54----18:24	7.3E-03 1.3E-06 9.1E-03 9	3.3E+00 5.3E-02 1.8E-02 348	5.9E-02 2.4E-02 22	1.6E+00 2.9E-02 993
18:04----18:34	6.4E-03 1.3E-06 9.9E-03 8	3.7E+00 4.9E-02 1.8E-02 322	4.6E-02 2.1E-02 21	1.8E+00 2.8E-02 993
18:14----18:44	5.7E-03 1.3E-06 9.3E-03 10	3.9E+00 5.1E-02 1.6E-02 295	4.1E-02 2.2E-02 21	1.9E+00 2.9E-02 993
18:24----18:54	5.2E-03 1.3E-06 8.8E-03 14	4.0E+00 5.1E-02 1.4E-02 283	4.5E-02 2.0E-02 20	2.0E+00 3.1E-02 993
18:34----19:04	4.5E-03 1.3E-06 1.1E-02 13	3.6E+00 4.1E-02 1.2E-02 278	4.3E-02 1.8E-02 20	1.8E+00 2.3E-02 993
18:44----19:14	4.7E-03 1.3E-06 1.1E-02 14	3.7E+00 4.0E-02 1.1E-02 286	4.7E-02 1.8E-02 20	1.8E+00 2.3E-02 993

STATISTICS

NUMBER OF READINGS 195

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	3.53E-03	2.36E-02	7.27E-03	3.17E-03	6.74E-03	1.46E+00
THC	2.97E+00	8.98E+00	3.51E+00	8.58E-01	3.44E+00	1.20E+00
SO2	1.00E-06	1.75E-01	5.19E-02	3.37E-02	3.50E-02	3.57E+00
THC-CH4	1.43E+00	6.88E+00	1.72E+00	5.40E-01	1.67E+00	1.22E+00
CH4	1.00E-06	7.96E+00	4.08E-02	5.70E-01	1.08E-06	3.12E+00
NOX	1.86E-02	1.18E-01	5.75E-02	2.48E-02	5.13E-02	1.61E+00
NO2	1.00E-06	9.37E-02	2.49E-02	1.71E-02	1.26E-02	1.01E+01
NO	8.62E-03	7.99E-02	3.36E-02	1.83E-02	2.86E-02	1.79E+00
OZONE	1.49E-03	3.53E-02	1.20E-02	7.98E-03	9.89E-03	1.87E+00
SOLAR RAD	7.83E-03	5.74E-02	2.47E-02	1.26E-02	2.17E-02	1.67E+00
TEMP	19	26	22	2		
BAROMETER	993	994	994	0	994	1
WIND SPEED	2	27	14	5	13	2

S.S.MARIE #15

DATE: JUL 21 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: NORTH SHORE SAULT LOCKS (70240-51544); 0.6KN & 135DGS/SRC

TIME	H2S / CH4 / OZONE / WIND SPEED	THC / NOX / SOLAR RAD / WIND DIRECTION	SO2 / NO2 / TEMP	THC-CH4 / NO / BAROMETER
19:26----19:56	1.3E-02 3.0E+02 4.8E-03 15	4.4E+00 8.5E-02 5.5E-03 321	1.1E-01 3.6E-02 19	1.8E+00 4.7E-02 994
19:41----20:11	1.3E-02 1.1E+03 4.6E-03 10	4.7E+00 7.8E-02 3.5E-03 306	9.5E-02 3.9E-02 18	1.5E+00 4.1E-02 994
19:56----20:26	9.6E-03 1.7E+03 9.2E-03 8	3.9E+00 6.7E-02 1.5E-03 281	6.3E-02 3.7E-02 18	9.7E-01 3.3E-02 994
20:11----20:41	8.3E-03 1.6E+03 1.8E-02 6	4.7E+00 5.0E-02 1.0E-03 268	4.2E-02 2.6E-02 18	1.2E+00 2.5E-02 994
20:26----20:56	6.7E-03 1.6E+03 2.1E-02 4	7.2E+00 7.5E-02 7.7E-04 257	3.0E-02 3.1E-02 18	2.1E+00 5.7E-02 994
20:41----21:11	5.2E-03 1.7E+03 2.0E-02 4	7.9E+00 1.0E-01 4.9E-04 256	2.2E-02 5.3E-02 17	2.6E+00 7.1E-02 994
20:56----21:26	4.5E-03 1.6E+03 2.1E-02 6	7.1E+00 8.7E-02 2.3E-04 261	1.7E-02 4.4E-02 17	2.2E+00 5.5E-02 994
21:11----21:41	4.0E-03 1.6E+03 2.1E-02 7	6.0E+00 5.5E-02 1.2E-04 261	1.4E-02 2.1E-02 16	1.5E+00 3.9E-02 994
21:26----21:56	3.6E-03 1.6E+03 1.9E-02 4	6.4E+00 1.1E-01 6.6E-05 257	1.2E-02 5.8E-02 16	2.1E+00 7.9E-02 994
21:41----22:11	3.3E-03 1.7E+03 1.7E-02 2	8.1E+00 1.3E-01 3.4E-05 258	1.3E-02 6.0E-02 16	2.8E+00 1.1E-01 994

S.S.MARIE #15, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	T4C-CH4 NO BAROMETER
21:56----22:26	2.9E-03 1.7E+03 2.0E-02 5	6.3E+00 6.3E-02 3.0E-05 261	1.4E-02 1.7E-02 16	2.0E+00 5.6E-02 995
22:11----22:41	3.1E-03 1.6E+03 2.0E-02 8	4.2E+00 3.6E-02 3.2E-05 264	1.5E-02 1.4E-02 16	1.3E+00 2.6E-02 995
22:26----22:56	3.7E-03 1.6E+03 1.9E-02 8	3.8E+00 2.7E-02 3.3E-05 269	1.8E-02 1.5E-02 16	9.3E-01 1.3E-02 995
22:41----23:11	4.0E-03 1.6E+03 1.8E-02 6	4.4E+00 3.1E-02 3.1E-05 269	1.9E-02 1.8E-02 16	1.2E+00 1.6E-02 995
22:56----23:26	4.8E-03 1.6E+03 1.5E-02 5	4.6E+00 3.6E-02 3.2E-05 268	1.6E-02 2.2E-02 16	1.3E+00 1.8E-02 995
23:11----23:41	5.4E-03 1.7E+03 1.2E-02 5	4.4E+00 3.8E-02 3.2E-05 276	1.5E-02 2.3E-02 16	1.0E+00 1.8E-02 995
23:26----23:56	6.1E-03 1.7E+03 7.9E-03 3	5.3E+00 5.8E-02 3.4E-05 278	2.0E-02 4.2E-02 17	1.9E+00 2.9E-02 995
23:41----00:11	6.6E-03 1.8E+03 5.0E-03 2	6.1E+00 1.1E-01 3.5E-05 279	2.7E-02 4.2E-02 17	2.6E+00 8.8E-02 995
23:56----00:26	6.5E-03 1.7E+03 6.6E-03 3	6.0E+00 1.2E-01 3.1E-05 281	3.2E-02 4.2E-02 17	2.2E+00 8.4E-02 995
00:11----00:41	6.4E-03 1.7E+03 9.7E-03 2	5.6E+00 6.6E-02 3.1E-05 272	3.1E-02 4.4E-02 17	1.8E+00 2.9E-02 995
00:26----00:56	6.5E-03 1.6E+03 1.6E-02 4	4.7E+00 4.1E-02 3.1E-05 272	2.4E-02 2.5E-02 17	1.3E+00 1.9E-02 995

S.S.MARIE #15, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
00:41----01:11	6.3E-03 1.6E+03 1.5E-02 4	5.0E+00 5.2E-02 3.4E-05 275	2.1E-02 3.4E-02 17	1.5E+00 1.8E-02 995
00:56----01:26	6.1E-03 1.7E+03 1.3E-02 1	5.8E+00 5.5E-02 3.2E-05 253	2.2E-02 3.8E-02 17	2.0E+00 2.0E-02 994
01:11----01:41	5.6E-03 1.7E+03 1.7E-02 2	5.3E+00 4.0E-02 2.8E-05 238	2.1E-02 2.1E-02 17	1.8E+00 2.0E-02 994

STATISTICS

NUMBER OF READINGS 383

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	2.47E-03	3.20E-02	6.07E-03	3.09E-03	5.51E-03	1.53E+00
THC	3.18E+00	2.71E+01	5.49E+00	3.68E+00	4.84E+00	1.55E+00
SO2	1.06E-02	1.37E-01	3.06E-02	2.67E-02	2.43E-02	1.84E+00
THC-CH4	7.94E-01	1.25E+01	1.72E+00	1.62E+00	1.37E+00	1.80E+00
CH4	1.00E-06	7.31E+03	1.55E+03	5.34E+02	3.52E+02	2.53E+02
NOX	1.59E-02	1.17E+00	6.63E-02	8.20E-02	4.95E-02	1.98E+00
NO2	1.00E-06	4.59E-01	3.24E-02	5.08E-02	6.66E-03	3.03E+01
NO	7.56E-03	8.06E-01	4.14E-02	7.09E-02	2.58E-02	2.27E+00
OZONE	1.46E-04	2.66E-02	1.46E-02	6.72E-03	1.21E-02	2.10E+00
SOLAR RAD	1.00E-06	6.37E-03	6.53E-04	1.50E-03	9.58E-05	6.10E+00
TEMP	16	19	17	1		
BAROMETER	994	995	994	0	994	1
WIND SPEED	0	25	6	4	3	5

S.S.MARIE #16

DATE: JUL 22 1978
SCAN TIME: 90 SEC
AVERAGING TIME: 30 MIN
LOCATION: WHITEFISH ISLAND POINT (70235-51544); 0.7KM & 155DGS/SRC

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETER
10:11----10:41	4.4E-03 1.1E+00 2.1E-02 5	3.5E+00 2.9E-02 4.9E-02 232	7.1E-03 1.5E-02 22	1.9E+00 1.6E-02 994
10:26----10:56	3.6E-03 1.1E+00 2.0E-02 5	3.3E+00 5.8E-02 5.4E-02 234	5.2E-03 2.0E-02 21	1.9E+00 3.7E-02 994
10:41----11:11	3.7E-03 1.1E+00 2.0E-02 5	3.4E+00 7.9E-02 5.7E-02 240	5.6E-03 2.2E-02 22	1.9E+00 5.4E-02 994
10:56----11:26	4.1E-03 1.1E+00 2.2E-02 10	3.4E+00 6.7E-02 5.9E-02 251	9.0E-03 1.8E-02 22	1.9E+00 4.7E-02 994
11:11----11:41	4.0E-03 1.0E+00 2.5E-02 14	3.2E+00 5.4E-02 5.7E-02 252	7.0E-03 1.3E-02 21	1.9E+00 3.8E-02 994
11:26----11:56	3.6E-03 1.0E+00 2.5E-02 15	3.1E+00 4.6E-02 5.8E-02 257	5.2E-03 1.3E-02 20	1.8E+00 3.1E-02 994
11:41----12:11	3.1E-03 1.0E+00 2.6E-02 18	3.1E+00 3.4E-02 5.7E-02 260	3.6E-03 1.3E-02 20	1.7E+00 2.1E-02 994
11:56----12:26	2.8E-03 1.0E+00 2.7E-02 21	3.1E+00 3.0E-02 5.0E-02 259	2.9E-03 1.2E-02 20	1.7E+00 1.8E-02 994
12:11----12:41	2.9E-03 1.0E+00 2.6E-02 18	3.1E+00 3.2E-02 6.0E-02 261	6.6E-03 1.2E-02 20	1.8E+00 2.0E-02 994
12:26----12:56	3.1E-03 1.0E+00 2.6E-02 10	3.3E+00 3.5E-02 6.1E-02 261	7.3E-03 1.5E-02 22	1.9E+00 2.0E-02 993

S.S.MARIE #16, CONT'D

TIME	H2S CH4 OZONE WIND SPEED	THC NOX SOLAR RAD WIND DIRECTION	SO2 NO2 TEMP	THC-CH4 NO BAROMETRP
12:41----13:11	3.0E-03 1.0E+00 2.7E-02 8	3.3E+00 3.8E-02 4.4E-02 250	4.7E-03 2.5E-02 21	1.9E+00 1.7E-02 993
12:56----13:26	2.9E-03 1.0E+00 2.6E-02 11	3.1E+00 3.9E-02 3.5E-02 251	5.7E-03 2.5E-02 20	1.8E+00 1.8E-02 993
13:11----13:41	2.8E-03 1.0E+00 2.6E-02 18	3.1E+00 3.3E-02 3.0E-02 262	6.4E-03 1.4E-02 19	1.8E+00 1.9E-02 993
13:26----13:56	2.5E-03 9.9E-01 2.7E-02 19	3.1E+00 2.5E-02 2.0E-02 266	5.2E-03 1.2E-02 18	1.8E+00 1.4E-02 993
13:41----14:11	2.3E-03 9.5E-01 2.7E-02 13	3.0E+00 2.0E-02 2.3E-02 268	1.9E-03 9.1E-03 18	1.8E+00 1.1E-02 993
13:56----14:26	2.2E-03 9.2E-01 2.7E-02 10	3.0E+00 2.2E-02 2.4E-02 271	1.1E-06 8.3E-03 18	1.7E+00 1.4E-02 992
14:11----14:41	2.1E-03 9.0E-01 2.6E-02 7	3.2E+00 2.9E-02 2.4E-02 267	2.5E-02 1.2E-02 19	1.9E+00 1.7E-02 992
14:26----14:56	2.0E-03 9.1E-01 2.5E-02 3	3.4E+00 3.4E-02 2.2E-02 265	2.5E-02 1.8E-02 20	2.2E+00 1.8E-02 992
14:41----15:11	2.3E-03 9.1E-01 1.9E-02 6	3.3E+00 5.2E-02 1.2E-02 286	1.1E-06 3.0E-02 20	2.1E+00 2.6E-02 992
14:56----15:26	2.6E-03 8.9E-01 1.3E-02 9	3.2E+00 6.7E-02 9.7E-03 286	1.1E-06 3.6E-02 20	1.9E+00 3.4E-02 992
15:11----15:41	2.4E-03 8.7E-01 1.7E-02 5	3.1E+00 4.3E-02 1.3E-02 268	1.1E-06 2.5E-02 19	2.0E+00 2.0E-02 992

S.S.MARIE #16, CONT'D

TIME	H2S	THC	SO2	THC-CH4
	CH4	NOX	NO2	NO
	OZONE	SOLAR RAD	TEMP	BAROMETER
	WIND SPEED	WIND DIRECTION		

STATISTICS

NUMBER OF READINGS 226

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.60E-03	5.78E-03	2.99E-03	8.17E-04	2.88E-03	1.30E+00
THC	2.98E+00	5.39E+00	3.21E+00	2.93E-01	3.20E+00	1.08E+00
SO2	1.00E-06	4.99E-01	6.01E-03	3.35E-02	1.39E-04	7.55E+01
THC-CH4	1.72E+00	4.90E+00	1.88E+00	3.51E-01	1.86E+00	1.14E+00
CH4	8.25E-01	1.14E+00	9.86E-01	7.61E-02	9.83E-01	1.08E+00
NOX	1.40E-02	1.81E-01	4.04E-02	2.45E-02	3.52E-02	1.64E+00
NO2	1.00E-06	2.12E-01	1.77E-02	1.81E-02	1.27E-02	3.50E+00
NO	7.18E-03	7.96E-02	2.36E-02	1.47E-02	2.03E-02	1.70E+00
OZONE	1.82E-03	2.97E-02	2.33E-02	5.09E-03	2.23E-02	1.44E+00
SOLAR RAD	6.59E-03	7.89E-02	3.90E-02	2.10E-02	3.22E-02	1.97E+00
TEMP	17	24	20	1		
BAROMETER	991	994	993	1	993	1
WIND SPEED	0	25	11	6	8	4

S.S.MARIE #17

DATE: JUL 23 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION:
WHITEFISH ISLAND POINT (70235-51544); 0.7KM & 155DGS/SRC - NO CAT 0%

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
15:07----15:37	1.0E-02 21	3.8E-02 997	1.7E-02 19	7.2E-02 304
15:22----15:52	4.6E-03 22	4.4E-02 998	1.8E-02 19	6.8E-02 310
15:37----16:07	4.2E-03 22	3.6E-02 998	1.8E-02 19	6.3E-02 315
15:52----16:22	5.5E-03 22	3.6E-02 998	1.6E-02 20	6.0E-02 314
16:07----16:37	2.9E-03 21	3.8E-02 998	1.5E-02 22	5.9E-02 308
16:22----16:52	1.7E-04 21	5.2E-02 998	1.5E-02 22	5.7E-02 309
16:37----17:07	1.3E-03 21	8.7E-02 998	1.4E-02 23	5.5E-02 311
16:52----17:22	4.6E-03 21	9.6E-02 998	1.5E-02 24	5.2E-02 315
17:07----17:37	1.9E-02 21	1.0E-01 998	1.4E-02 23	4.8E-02 321
17:22----17:52	3.2E-02 21	1.1E-01 998	1.3E-02 21	4.3E-02 324
17:37----18:07	2.5E-02 21	9.1E-02 998	1.3E-02 22	3.9E-02 340
17:52----18:22	1.5E-02 21	8.1E-02 998	1.2E-02 25	3.5E-02 352
18:07----18:37	1.5E-02 21	9.3E-02 998	1.2E-02 22	3.1E-02 346
18:22----18:52	1.7E-02 21	1.3E-01 998	1.1E-02 20	2.8E-02 338
18:37----19:07	1.3E-02 20	1.4E-01 998	1.1E-02 21	2.4E-02 340
18:52----19:22	1.4E-02 20	1.5E-01 998	1.0E-02 20	2.1E-02 340

S.S.MARIE #17, CONT'D

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
19:07----19:37	1.5E-02 20	1.6E-01 998	8.8E-03 17	1.7E-02 346
19:22----19:52	1.2E-02 19	1.5E-01 998	7.4E-03 14	1.4E-02 349
19:37----20:07	1.1E-02 19	1.4E-01 998	6.9E-03 15	1.0E-02 349
19:52----20:22	7.7E-03 19	1.3E-01 998	7.2E-03 15	7.7E-03 354
20:07----20:37	5.1E-03 18	1.2E-01 998	6.4E-03 15	5.0E-03 358
20:22----20:52	4.3E-03 18	1.1E-01 998	5.3E-03 16	2.8E-03 1
20:37----21:07	6.9E-03 17	1.1E-01 998	3.6E-03 13	1.7E-03 359
20:52----21:22	7.6E-03 17	1.2E-01 999	2.6E-03 12	1.1E-03 357
21:07----21:37	3.9E-03 16	1.0E-01 999	7.1E-03 15	4.5E-04 359
21:22----21:52	1.5E-03 16	8.4E-02 999	7.5E-03 15	1.4E-04 359
21:37----22:07	7.8E-04 16	7.2E-02 999	5.9E-03 13	2.9E-05 8
21:52----22:22	2.3E-04 15	4.5E-02 999	1.2E-02 11	3.9E-06 22
22:07----22:37	3.1E-05 15	3.1E-02 999	1.4E-02 7	4.5E-06 27
22:22----22:52	1.2E-04 15	2.7E-02 999	1.0E-02 1	9.7E-06 31
22:37----23:07	5.4E-04 14	2.5E-02 999	1.0E-02 2	7.2E-06 239
22:52----23:22	4.3E-04 14	2.2E-02 999	1.4E-02 3	1.6E-06 264
23:07----23:37	1.3E-06 14	2.1E-02 999	1.7E-02 6	6.2E-06 273
23:22----23:52	1.3E-06 14	2.2E-02 1000	1.9E-02 8	1.1E-05 273
23:37----00:07	5.5E-05 14	2.1E-02 1000	1.7E-02 6	6.9E-06 269

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
23:52----00:22	2.9E-04 13	1.9E-02 1000	1.1E-02 4	1.7E-06 277
00:07----00:37	2.4E-04 13	1.9E-02 1000	4.5E-03 5	2.6E-06 283
00:22----00:52	1.3E-06 13	1.9E-02 1000	1.8E-03 4	2.7E-06 282
00:37----01:07	1.1E-04 13	2.0E-02 1000	7.4E-04 4	2.3E-06 273
00:52----01:22	1.1E-04 12	1.9E-02 1000	2.3E-03 4	6.0E-06 274
01:07----01:37	1.3E-06 12	1.9E-02 1000	3.4E-03 4	8.9E-06 281
01:22----01:52	1.3E-06 13	1.9E-02 1000	2.3E-03 4	9.2E-06 283
01:37----02:07	1.3E-06 13	2.0E-02 1000	1.8E-03 3	1.2E-05 294
01:52----02:22	1.3E-06 13	1.9E-02 1000	9.5E-04 1	1.2E-05 348
02:07----02:37	1.3E-06 12	1.8E-02 1000	3.9E-05 2	1.0E-05 51
02:22----02:52	1.3E-06 11	1.7E-02 1000	7.3E-05 2	2.0E-05 61
02:37----03:07	1.3E-06 11	1.9E-02 1000	1.7E-04 1	2.4E-05 72
02:52----03:22	1.3E-06 11	2.0E-02 1000	1.4E-04 0	2.8E-05 47
03:07----03:37	1.3E-06 12	1.9E-02 1000	2.5E-05 1	3.1E-05 40
03:22----03:52	1.3E-06 11	1.9E-02 1000	2.2E-05 2	2.2E-05 49
03:37----04:07	1.3E-06 11	1.9E-02 1000	9.3E-06 1	1.5E-05 52
03:52----04:22	1.9E-05 11	1.9E-02 1000	4.7E-06 1	1.8E-05 53
04:07----04:37	1.9E-05 11	1.9E-02 1000	9.0E-06 0	2.3E-05 62
04:22----04:52	3.0E-04 11	1.9E-02 1000	5.8E-05 0	2.8E-05 100

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
04:37----05:07	3.6E-04 11	1.9E-02 1000	9.7E-04 1	3.6E-05 117
04:52----05:22	6.1E-05 11	1.8E-02 1000	2.1E-03 2	3.4E-05 121
05:07----05:37	4.9E-05 11	1.7E-02 1000	2.0E-03 2	3.2E-05 114
05:22----05:52	9.0E-05 11	1.8E-02 1000	1.3E-03 1	3.7E-05 78
05:37----06:07	4.2E-05 11	1.8E-02 1000	6.0E-04 2	1.0E-04 58
05:52----06:22	1.3E-06 11	1.8E-02 1000	2.9E-04 2	3.5E-04 53
06:07----06:37	1.3E-06 11	1.8E-02 1000	2.7E-04 0	9.6E-04 59
06:22----06:52	1.3E-06 11	1.8E-02 1000	2.1E-04 0	1.9E-03 58
06:37----07:07	2.3E-04 11	1.8E-02 1001	6.1E-04 1	5.4E-03 96
06:52----07:22	2.3E-04 12	1.8E-02 1001	1.5E-03 1	1.1E-02 109
07:07----07:37	1.3E-06 13	1.9E-02 1001	2.7E-03 2	1.3E-02 116
07:22----07:52	1.5E-05 13	1.8E-02 1001	3.4E-03 3	1.3E-02 116
07:37----08:07	3.0E-04 13	1.8E-02 1001	3.7E-03 1	1.3E-02 117
07:52----08:22	3.8E-04 14	1.8E-02 1001	4.1E-03 1	1.4E-02 108
08:07----08:37	1.3E-04 14	1.7E-02 1001	4.5E-03 1	1.5E-02 89
08:22----08:52	3.1E-05 15	1.7E-02 1001	4.9E-03 1	1.5E-02 92
08:37----09:07	2.8E-06 15	1.7E-02 1001	5.4E-03 2	1.7E-02 102
08:52----09:22	1.3E-06 16	1.7E-02 1001	8.0E-03 2	2.0E-02 113
09:07----09:37	1.3E-06 16	1.8E-02 1001	1.1E-02 4	3.0E-02 114

TIME H2S SO2 OZONE SOLAR RAD
TEMP BAROMETER WIND SPEED WIND DIRECTI

STATISTICS

NUMBER OF READINGS 1114

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.00E-06	4.77E-02	3.65E-03	7.22E-03	3.61E-05	6.60E+01
SO2	1.19E-02	2.16E-01	4.80E-02	4.53E-02	3.34E-02	2.22E+00
OZONE	1.00E-06	2.37E-02	6.84E-03	6.37E-03	1.51E-03	2.03E+01
SOLAR RAD	1.00E-06	7.72E-02	1.41E-02	2.09E-02	4.69E-04	5.14E+01
TEMP	11	23	15	4		
BAROMETER	997	1001	999	1	999	1
WIND SPEED	0	33	9	9	3	12

S.S.MARIE #18

DATE: JUL 24 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: MERRIFIELD P.S. (70285-51563); 1.6KM & 035DGS/SRC

TIME	H2S TEMP WIND DIRECTION	SO2 HUMIDITY	OZONE BAROMETER	SOLAR RAD WIND SPEED
12:23----12:53	7.8E-03 7771 202	9.7E-03 56	3.4E-02 999	6.0E-02 8
12:38----13:08	4.8E-03 31 201	5.7E-03 57	3.6E-02 999	4.8E-02 9
12:53----13:23	2.6E-03 29 196	4.0E-03 61	3.6E-02 999	3.8E-02 8
13:08----13:38	1.1E-03 30 197	4.4E-03 57	3.6E-02 998	6.1E-02 8
13:23----13:53	3.6E-04 31 203	5.1E-03 53	3.6E-02 998	7.0E-02 9
13:38----14:08	5.9E-05 32 208	5.3E-03 51	3.6E-02 998	6.0E-02 9
13:53----14:23	1.0E-06 32 206	5.2E-03 50	3.5E-02 998	5.4E-02 8
14:08----14:38	7.7E-04 30 226	1.1E-02 54	2.9E-02 998	5.2E-02 7
14:23----14:53	1.2E-03 31 242	1.4E-02 53	2.7E-02 998	6.7E-02 8
14:38----15:08	7.8E-04 32 235	1.6E-02 48	2.7E-02 998	7.8E-02 9
14:53----15:23	8.0E-04 33 229	1.7E-02 46	2.7E-02 998	7.7E-02 9
15:08----15:38	1.1E-03 33 233	1.7E-02 45	2.9E-02 997	7.6E-02 8

TIME	H2S TEMP WIND DIRECTION	SO2 HUMIDITY	OZONE BAROMETER	SOLAR RAD WIND SPEED
15:23----15:53	1.3E-03 33 234	2.4E-02 43	2.7E-02 997	7.2E-02 8
15:38----16:08	2.3E-03 33 231	3.4E-02 42	2.5E-02 997	6.9E-02 7
15:53----16:23	2.0E-03 34 227	3.6E-02 40	2.7E-02 997	7.2E-02 7
16:08----16:38	4.7E-04 34 214	2.4E-02 40	3.2E-02 997	6.1E-02 8
16:23----16:53	3.5E-05 32 202	1.1E-02 43	3.5E-02 997	4.9E-02 9
16:38----17:08	1.0E-06 31 204	7.6E-03 45	3.5E-02 997	5.5E-02 10
16:53----17:23	1.0E-06 32 215	6.4E-03 43	3.5E-02 996	5.8E-02 10
17:08----17:38	6.9E-05 32 215	6.0E-03 42	3.5E-02 996	5.6E-02 10
17:23----17:53	1.6E-04 31 209	6.3E-03 42	3.6E-02 996	5.2E-02 11
17:38----18:08	3.2E-04 31 204	6.5E-03 42	3.6E-02 996	5.0E-02 11
17:53----18:23	3.2E-04 31 202	7.2E-03 42	3.4E-02 996	4.1E-02 9
18:08----18:38	9.1E-05 31 208	8.0E-03 41	3.4E-02 996	3.6E-02 9
18:23----18:53	1.9E-05 30 210	8.3E-03 41	3.6E-02 996	3.8E-02 10
18:38----19:08	1.9E-05 30 205	8.3E-03 40	3.6E-02 996	3.5E-02 9

TIME	H2S TEMP WIND DIRECTION	SO2 HUMIDITY	OZONE BAROMETER	SOLAR RAD WIND SPEED
18:53----19:23	1.0E-06 30 200	8.1E-03 40	3.6E-02 996	3.0E-02 7
19:08----19:38	1.0E-06 30 194	7.9E-03 41	3.4E-02 996	2.6E-02 6

STATISTICS

NUMBER OF READINGS 448

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.00E-06	1.26E-02	1.11E-03	2.15E-03	3.79E-05	3.67E+01
SO2	2.63E-03	7.62E-02	1.14E-02	9.42E-03	9.13E-03	1.85E+00
OZONE	1.46E-02	4.01E-02	3.28E-02	4.80E-03	3.24E-02	1.18E+00
SOLAR RAD	1.10E-02	1.02E-01	5.35E-02	2.15E-02	4.87E-02	1.58E+00
TEMP	28	232212	550	10970		
HUMIDITY	37	75	46	7	46	1
BAROMETER	996	999	997	1	997	1
WIND SPEED	1	20	9	3	8	2

S.S.MARIE #19

DATE: JUL 24 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: DAVID KYLE P.S. (70200-51564); 1.3KM & 005DGS/SRC

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
20:32----21:02	7.8E-03 7771	9.7E-03 999	3.4E-02 8	6.0E-02 202
20:47----21:17	4.7E-03 31	5.7E-03 999	3.6E-02 9	4.9E-02 199
21:02----21:32	1.9E-03 26	4.0E-03 997	3.2E-02 7	2.7E-02 177
21:17----21:47	4.5E-04 22	3.8E-03 996	2.5E-02 6	1.0E-02 142
21:32----22:02	6.2E-04 20	3.8E-03 996	2.3E-02 7	5.1E-06 130
21:47----22:17	7.6E-04 20	3.7E-03 996	2.2E-02 7	8.9E-06 133
22:02----22:32	8.2E-04 19	4.2E-03 996	2.0E-02 7	1.1E-05 131
22:17----22:47	9.6E-04 19	4.4E-03 996	1.8E-02 6	9.5E-06 130
22:32----23:02	9.2E-04 19	3.9E-03 995	1.8E-02 7	9.7E-06 131
22:47----23:17	8.0E-04 19	3.1E-03 995	1.7E-02 7	1.2E-05 128
23:02----23:32	7.1E-04 19	3.6E-03 995	9.2E-03 4	1.5E-05 121
23:17----23:47	5.2E-04 18	3.5E-03 995	9.8E-03 2	1.7E-05 85
23:32----00:02	4.2E-04 14	2.1E-03 763	8.7E-03 1	9.3E-06 71
23:47----00:17	2.0E-04 5	7.3E-04 265	1.4E-03 0	1.1E-06 26
00:02----00:32	2.1E-04 9	1.2E-03 497	4.7E-03 1	2.9E-06 34
00:17----00:47	4.9E-04 17	2.9E-03 995	1.0E-02 1	4.8E-06 33

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
00:32----01:02	3.6E-04 17	2.5E-03 995	1.4E-02 2	1.5E-05 50
00:47----01:17	1.2E-04 17	1.2E-03 995	1.6E-02 3	2.1E-05 65
01:02----01:32	9.9E-05 17	1.4E-03 994	1.6E-02 3	1.9E-05 80
01:17----01:47	1.5E-04 17	2.2E-03 994	1.4E-02 2	1.9E-05 84
01:32----02:02	2.4E-04 17	2.4E-03 994	1.5E-02 0	1.5E-05 77
01:47----02:17	2.1E-04 17	2.2E-03 994	1.4E-02 0	1.8E-05 56
02:02----02:32	9.4E-05 17	1.9E-03 994	1.2E-02 0	2.1E-05 29
02:17----02:47	3.4E-05 16	2.1E-03 994	1.2E-02 0	1.1E-05 358
02:32----03:02	6.4E-05 16	1.9E-03 994	1.3E-02 0	6.8E-06 348
02:47----03:17	6.8E-05 16	1.7E-03 994	1.3E-02 0	1.1E-05 340
03:02----03:32	5.7E-05 16	2.2E-03 994	1.2E-02 0	1.2E-05 340
03:17----03:47	7.6E-05 16	2.5E-03 994	1.4E-02 0	9.9E-06 357
03:32----04:02	9.4E-05 16	2.3E-03 994	1.5E-02 0	8.2E-06 9
03:47----04:17	1.2E-04 15	2.3E-03 994	1.5E-02 0	1.2E-05 18
04:02----04:32	1.1E-04 15	2.2E-03 994	1.6E-02 0	1.5E-05 6
04:17----04:47	6.8E-05 15	2.0E-03 994	1.8E-02 0	1.5E-05 337
04:32----05:02	5.1E-05 15	2.1E-03 994	1.7E-02 0	1.9E-05 35
04:47----05:17	4.2E-05 15	2.2E-03 993	1.6E-02 0	2.0E-05 69
05:02----05:32	8.2E-05 15	1.9E-03 993	1.6E-02 0	1.8E-05 71

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
05:17----05:47	9.6E-05 15	1.9E-03 993	1.3E-02 0	5.6E-05 24
05:32----06:02	3.9E-05 15	2.2E-03 993	1.1E-02 0	2.2E-04 31
05:47----06:17	2.8E-05 15	2.2E-03 993	8.9E-03 1	6.1E-04 50
06:02----06:32	3.2E-05 15	2.4E-03 993	8.3E-03 1	1.4E-03 56
06:17----06:47	2.2E-05 16	2.2E-03 993	7.3E-03 2	3.2E-03 80
06:32----07:02	3.7E-06 17	2.2E-03 993	8.5E-03 2	6.2E-03 90
06:47----07:17	5.4E-06 18	2.5E-03 992	9.3E-03 2	1.0E-02 95
07:02----07:32	1.5E-04 19	1.9E-03 992	8.6E-03 4	1.3E-02 117
07:17----07:47	3.0E-04 19	1.7E-03 992	1.4E-02 6	1.5E-02 128
07:32----08:02	3.5E-04 20	2.3E-03 992	2.1E-02 6	1.7E-02 129
07:47----08:17	7.2E-04 21	4.4E-03 992	2.1E-02 4	1.9E-02 138
08:02----08:32	7.4E-03 22	1.1E-02 993	1.6E-02 4	2.3E-02 217
08:17----08:47	1.5E-02 23	1.3E-02 993	1.5E-02 8	2.6E-02 235
08:32----09:02	2.1E-02 23	1.7E-02 993	1.4E-02 9	2.6E-02 231
08:47----09:17	2.1E-02 24	3.1E-02 992	1.8E-02 6	3.1E-02 203
09:02----09:32	1.8E-02 24	3.7E-02 992	2.2E-02 6	3.7E-02 206
09:17----09:47	1.9E-02 25	3.0E-02 992	2.2E-02 11	4.1E-02 228
09:32----10:02	1.7E-02 26	2.4E-02 992	2.6E-02 12	3.9E-02 225
09:47----10:17	2.0E-02 25	3.2E-02 992	2.3E-02 11	3.0E-02 222

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
10:02----10:32	2.4E-02 25	5.6E-02 991	2.0E-02 9	2.7E-02 209
10:17----10:47	1.8E-02 25	6.1E-02 991	3.3E-02 9	3.1E-02 175
10:32----11:02	9.7E-03 25	4.0E-02 990	4.4E-02 10	3.0E-02 152
10:47----11:17	7.2E-03 24	2.7E-02 989	4.6E-02 11	1.5E-02 147
11:02----11:32	5.9E-03 23	2.1E-02 988	4.7E-02 11	1.6E-02 141
11:17----11:47	5.1E-03 23	1.6E-02 988	4.9E-02 12	2.7E-02 132
11:32----12:02	4.3E-03 24	1.5E-02 989	5.1E-02 11	3.4E-02 143
11:47----12:17	4.1E-03 25	2.6E-02 989	4.6E-02 11	3.6E-02 168

STATISTICS

NUMBER OF READINGS 953

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.00E-06	3.26E-02	4.06E-03	7.21E-03	1.79E-04	3.91E+01
SO2	1.00E-06	9.66E-02	1.01E-02	1.56E-02	3.59E-03	6.55E+00
OZONE	1.00E-06	5.77E-02	1.96E-02	1.24E-02	1.36E-02	4.81E+00
SOLAR RAD	1.00E-06	1.02E-01	1.23E-02	1.87E-02	3.01E-04	5.33E+01
JEMP	0	232212	263	7521		
BAROMETER	0	999	970	149	616	22
WIND SPEED	0	24	5	5	1	39

S.S.MARIE #20

DATE: JUL 25 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: DAVID KYLE P.S. (70200-51564); 1.3KM & 005DGS/SRC

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
12:47----13:17	2.0E-02 28	1.0E-01 989	3.5E-02 14	4.5E-02 203
13:02----13:32	2.6E-02 26	1.3E-01 989	2.6E-02 12	2.6E-02 202
13:17----13:47	3.3E-02 26	1.6E-01 988	1.8E-02 9	1.4E-02 208
13:32----14:02	2.2E-02 25	1.2E-01 988	2.9E-02 9	1.2E-02 181
13:47----14:17	1.7E-02 24	9.4E-02 988	3.9E-02 10	1.6E-02 169
14:02----14:32	1.4E-02 25	7.6E-02 988	4.0E-02 9	1.6E-02 174
14:17----14:47	9.7E-03 25	7.7E-02 988	3.9E-02 9	1.6E-02 184
14:32----15:02	1.2E-02 26	1.2E-01 988	3.4E-02 11	2.5E-02 197
14:47----15:17	2.5E-02 27	1.1E-01 987	3.4E-02 13	4.4E-02 210
15:02----15:32	3.6E-02 29	9.2E-02 987	4.3E-02 15	5.7E-02 216
15:17----15:47	3.0E-02 29	6.3E-02 987	5.8E-02 18	3.9E-02 221
15:32----16:02	1.8E-02 27	3.2E-02 987	6.9E-02 20	2.3E-02 222
15:47----16:17	1.2E-02 27	2.4E-02 988	7.6E-02 20	3.0E-02 223

STATISTICS

NUMBER OF READINGS 223

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	6.35E-03	4.34E-02	2.01E-02	1.09E-02	1.72E-02	1.75E+00
SO2	1.72E-02	1.83E-01	8.59E-02	4.71E-02	7.03E-02	1.99E+00
OZONE	1.05E-02	8.65E-02	4.45E-02	2.03E-02	3.98E-02	1.63E+00
SOLAR RAD	7.15E-03	9.44E-02	2.94E-02	1.84E-02	2.47E-02	1.80E+00
TEMP	23	30	27	2		
BAROMETER	987	989	988	0	988	1
WIND SPEED	3	31	14	5	13	2

S.S.MARIE #21

DATE: JUL 25 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: DAVID KYLE P.S. (70200-51564); 1.3KM & 005DGS/SRC

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
17:09----17:39	3.5E-02 29	3.9E-02 987	4.8E-02 14	3.9E-02 223
17:24----17:54	3.1E-02 28	6.5E-02 987	4.6E-02 13	2.7E-02 223
17:39----18:09	2.3E-02 27	6.2E-02 987	6.0E-02 13	2.1E-02 229
17:54----18:24	1.3E-02 27	3.8E-02 987	7.5E-02 13	2.1E-02 233
18:09----18:39	8.3E-03 27	2.5E-02 987	7.5E-02 13	2.2E-02 230
18:24----18:54	8.9E-03 27	2.1E-02 987	6.5E-02 13	2.1E-02 227
18:39----19:09	1.1E-02 27	2.2E-02 987	5.8E-02 11	1.5E-02 226
18:54----19:24	1.1E-02 27	2.3E-02 986	5.7E-02 11	1.1E-02 232
19:09----19:39	7.4E-03 26	1.9E-02 986	6.1E-02 12	1.2E-02 335
19:24----19:54	5.6E-03 26	1.3E-02 986	5.7E-02 12	1.1E-02 231
19:39----20:09	1.1E-02 26	9.8E-03 986	3.9E-02 12	7.5E-03 229
19:54----20:24	2.4E-02 27	1.8E-02 986	2.7E-02 12	7.6E-03 230
20:09----20:39	3.6E-02 27	5.3E-02 986	2.1E-02 12	8.2E-03 226
20:24----20:54	3.2E-02 26	5.8E-02 986	2.0E-02 11	5.4E-03 225
20:39----21:09	2.8E-02 26	7.5E-02 986	1.9E-02 9	2.0E-03 229
20:54----21:24	3.1E-02 26	1.2E-01 986	2.0E-02 10	6.5E-04 228

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
21:09----21:39	2.7E-02 24	9.4E-02 986	2.4E-02 11	2.5E-04 226
21:24----21:54	2.4E-02 23	3.4E-02 986	2.6E-02 9	6.1E-05 225
21:39----22:09	3.0E-02 22	1.5E-02 986	1.9E-02 7	7.1E-06 227
21:54----22:24	3.2E-02 24	1.7E-02 986	1.9E-02 8	1.2E-05 228
22:09----22:39	2.8E-02 25	3.8E-02 986	3.1E-02 8	2.5E-05 226
22:24----22:54	3.5E-02 25	7.1E-02 986	3.7E-02 8	3.2E-05 224
22:39----23:09	4.2E-02 23	7.1E-02 986	3.1E-02 7	2.0E-05 223
22:54----23:24	3.0E-02 22	3.6E-02 986	3.9E-02 6	4.4E-06 229
23:09----23:39	1.4E-02 23	1.4E-02 986	5.7E-02 5	2.1E-05 235
23:24----23:54	8.6E-03 24	1.2E-02 985	6.9E-02 6	3.8E-05 235
23:39----00:09	7.3E-03 23	9.2E-03 985	7.2E-02 7	2.4E-05 237
23:54----00:24	7.8E-03 22	4.5E-03 985	6.4E-02 7	2.0E-05 244
00:09----00:39	8.6E-03 23	9.4E-04 985	5.7E-02 5	3.1E-05 242
00:24----00:54	6.2E-03 24	7.1E-05 985	5.7E-02 2	3.0E-05 212
00:39----01:09	2.7E-03 24	3.3E-04 985	5.8E-02 1	2.5E-05 121
00:54----01:24	1.8E-03 22	4.4E-04 985	5.9E-02 1	1.8E-05 152
01:09----01:39	5.2E-03 21	4.9E-03 985	5.9E-02 1	1.9E-05 197
01:24----01:54	5.3E-03 23	7.5E-03 985	6.0E-02 1	2.7E-05 183
01:39----02:09	1.4E-03 24	4.6E-03 984	6.2E-02 2	2.7E-05 149

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
01:54----02:24	6.0E-04 22	2.1E-03 984	6.1E-02 2	1.8E-05 155
02:09----02:39	4.5E-04 20	3.3E-04 984	6.0E-02 1	1.1E-05 168
02:24----02:54	2.3E-04 21	6.4E-05 984	6.0E-02 0	1.3E-05 154
02:39----03:09	2.7E-06 21	2.2E-06 984	5.8E-02 0	1.8E-05 97
02:54----03:24	1.8E-03 21	2.9E-04 984	5.0E-02 1	2.9E-05 197
03:09----03:39	7.0E-03 23	2.5E-03 983	4.1E-02 3	3.6E-05 222
03:24----03:54	9.3E-03 23	2.3E-03 983	3.5E-02 3	3.1E-05 223
03:39----04:09	9.9E-03 24	3.0E-05 983	2.9E-02 3	2.7E-05 225
03:54----04:24	1.1E-02 24	4.5E-06 983	2.9E-02 2	3.4E-05 222
04:09----04:39	1.4E-02 24	3.5E-03 983	3.2E-02 3	3.9E-05 223
04:24----04:54	2.1E-02 22	1.8E-02 983	2.6E-02 6	2.3E-05 222
04:39----05:09	2.3E-02 21	3.0E-02 983	1.6E-02 6	1.6E-05 221
04:54----05:24	2.2E-02 21	1.9E-02 983	1.0E-02 4	2.5E-05 221
05:09----05:39	2.0E-02 21	8.1E-03 983	1.7E-02 4	2.9E-05 216
05:24----05:54	1.5E-02 22	7.8E-03 983	3.0E-02 4	3.4E-05 216
05:39----06:09	9.0E-03 24	7.0E-03 983	3.4E-02 1	5.5E-05 215
05:54----06:24	4.3E-03 23	5.0E-03 983	2.8E-02 0	1.2E-04 100
06:09----06:39	2.0E-03 22	2.2E-03 983	2.6E-02 1	2.4E-04 123
06:24----06:54	1.0E-03 20	2.7E-04 983	2.5E-02 1	4.3E-04 120

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
06:39----07:09	3.7E-04 21	2.2E-06 983	2.3E-02 1	6.9E-04 97
06:54----07:24	1.2E-05 21	2.2E-06 983	2.6E-02 1	1.1E-03 81
07:09----07:39	1.7E-06 20	2.2E-06 983	2.8E-02 1	1.8E-03 71
07:24----07:54	1.7E-06 21	2.2E-06 983	2.7E-02 0	2.1E-03 75
07:39----08:09	1.7E-06 23	2.2E-06 983	2.8E-02 1	2.2E-03 115
07:54----08:24	1.7E-06 23	2.2E-06 983	2.8E-02 1	3.0E-03 125
08:09----08:39	1.7E-06 24	2.2E-06 983	2.5E-02 1	4.3E-03 135
08:24----08:54	1.7E-06 1	2.2E-06 971	1.6E-02 1	5.5E-03 228
08:39----09:09	1.7E-06 -32	2.2E-06 954	3.4E-03 1	6.1E-03 249
08:54----09:24	1.7E-06 -40	2.2E-06 950	2.4E-06 1	6.8E-03 251

STATISTICS

NUMBER OF READINGS 979

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.00E-06	5.13E-02	1.26E-02	1.30E-02	1.49E-03	4.61E+01
SO2	1.00E-06	1.55E-01	1.88E-02	2.92E-02	6.04E-04	1.03E+02
OZONE	1.00E-06	8.39E-02	3.90E-02	2.11E-02	2.18E-02	9.69E+00
SOLAR RAD	1.00E-06	5.99E-02	4.52E-03	9.05E-03	2.31E-04	2.10E+01
TEMP	-41	29	21	14		
BAROMETER	948	987	983	7	983	1
WIND SPEED	0	22	6	5	2	15

S.S.MARIE #22

DATE: JUL 26 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: J.IRVING CHILDRENS' CENTRE (70280-51567); 2.0KM @ 030DGS/SRC

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
12:21----12:51	1.9E-02 24	2.5E-03 982	3.5E-02 14	9.5E-03 251
12:26----12:56	1.4E-02 24	1.2E-03 982	4.0E-02 15	1.3E-02 251
12:31----13:01	1.1E-02 25	6.2E-04 982	4.2E-02 15	1.7E-02 252

STATISTICS

NUMBER OF READINGS 43

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	5.36E-03	3.62E-02	1.49E-02	9.31E-03	1.25E-02	1.81E+00
SO2	1.00E-06	1.19E-02	1.75E-03	2.67E-03	1.38E-04	3.39E+01
OZONE	7.30E-03	4.99E-02	3.85E-02	1.03E-02	3.63E-02	1.49E+00
SOLAR RAD	4.65E-03	3.15E-02	1.50E-02	9.46E-03	1.20E-02	1.98E+00
TEMP	24	26	25	1		
BAROMETER	981	982	982	0	982	1
WIND SPEED	2	22	14	4	13	2

S.S.MARIE #23

DATE: JUL 26 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: PORTAGE LANE & JAMES ST (70285-51548); 0.9KM & 100DGS/SRC

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
13:32----14:02	2.4E-03 23	2.9E-05 981	4.2E-02 7	8.4E-03 242
13:47----14:17	1.9E-03 23	1.0E-06 981	3.8E-02 4	7.2E-03 224
14:02----14:32	1.5E-03 23	1.0E-06 981	3.9E-02 4	1.4E-02 224
14:17----14:47	1.0E-03 24	1.0E-06 981	4.3E-02 7	2.1E-02 237
14:32----15:02	7.8E-04 24	1.0E-06 982	3.7E-02 10	1.2E-02 256
14:47----15:17	1.1E-03 23	1.3E-04 982	3.6E-02 9	1.7E-02 260
15:02----15:32	1.1E-03 26	1.9E-03 981	4.1E-02 6	5.0E-02 246
15:17----15:47	4.2E-04 29	5.7E-03 981	4.5E-02 7	6.3E-02 235
15:32----16:02	1.1E-04 29	8.3E-03 981	4.7E-02 8	4.4E-02 244
15:47----16:17	2.9E-05 28	9.5E-03 981	4.8E-02 9	3.8E-02 243
16:02----16:32	4.7E-06 28	1.0E-02 981	5.0E-02 13	4.6E-02 248
16:17----16:47	1.0E-06 26	8.8E-03 981	5.2E-02 18	3.8E-02 256
16:32----17:02	1.0E-06 25	7.9E-03 980	5.5E-02 21	3.4E-02 257
16:47----17:17	1.0E-06 25	7.5E-03 980	5.2E-02 19	2.6E-02 260
17:02----17:32	9.8E-05 23	6.6E-03 980	5.1E-02 17	8.2E-03 265
17:17----17:47	7.9E-04 23	7.2E-03 980	5.4E-02 18	7.0E-03 267

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
17:32----18:02	2.0E-03 25	2.4E-02 980	4.1E-02 17	8.4E-03 281
17:47----18:17	2.9E-03 26	7.1E-02 980	2.0E-02 13	1.0E-02 308
18:02----18:32	2.0E-03 26	7.8E-02 980	2.0E-02 12	8.9E-03 320
18:17----18:47	3.8E-04 24	4.1E-02 980	3.4E-02 12	6.6E-03 331
18:32----19:02	1.4E-05 24	2.3E-02 980	4.1E-02 11	6.2E-03 334
18:47----19:17	1.0E-06 24	1.8E-02 980	4.0E-02 9	5.0E-03 337
19:02----19:32	1.0E-06 25	1.6E-02 980	3.3E-02 6	3.9E-03 343
19:17----19:47	1.1E-04 25	1.7E-02 980	2.8E-02 2	3.7E-03 344
19:32----20:02	1.1E-04 25	1.8E-02 980	2.9E-02 2	3.8E-03 351

STATISTICS

NUMBER OF READINGS 402

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.00E-06	9.62E-03	7.55E-04	1.12E-03	3.79E-05	3.30E+01
SO2	1.00E-06	1.70E-01	1.51E-02	2.25E-02	1.29E-03	6.24E+01
OZONE	4.70E-03	5.91E-02	4.02E-02	1.17E-02	3.76E-02	1.52E+00
SOLAR RAD	1.49E-03	7.52E-02	1.86E-02	2.05E-02	1.12E-02	2.67E+00
TEMP	22	31	25	2		
BAROMETER	980	982	981	1	981	1
WIND SPEED	0	30	10	6	7	4

S.S.MARIE #24

DATE: JUL 26 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: WHITEFISH ISLAND POINT (70230-51544); 0.7KM & 160DGS/SRC

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
20:39----21:09	1.9E-03 24	2.2E-02 980	1.9E-02 5	3.3E-03 292
20:54----21:24	4.7E-03 23	2.6E-02 980	1.9E-02 9	2.5E-03 295
21:09----21:39	4.6E-03 22	2.5E-02 980	2.3E-02 4	9.3E-04 307
21:24----21:54	3.9E-03 21	1.9E-02 980	2.8E-02 2	2.0E-04 234
21:39----22:09	4.4E-03 20	1.5E-02 980	2.6E-02 4	3.1E-06 246
21:54----22:24	3.5E-03 20	1.5E-02 980	2.3E-02 7	5.5E-06 275
22:09----22:39	4.4E-03 19	1.4E-02 980	2.8E-02 10	3.5E-06 271
22:24----22:54	4.5E-03 17	1.3E-02 980	3.2E-02 11	1.0E-06 269
22:39----23:09	3.3E-03 17	1.2E-02 980	3.1E-02 12	1.1E-06 270
22:54----23:24	2.2E-03 17	1.2E-02 980	3.0E-02 9	1.6E-06 266
23:09----23:39	1.3E-03 17	1.1E-02 980	2.8E-02 4	4.5E-06 231
23:24----23:54	9.1E-04 17	9.8E-03 980	2.8E-02 5	4.7E-06 213
23:39----00:09	8.4E-04 17	9.1E-03 980	2.3E-02 5	2.1E-06 229
23:54----00:24	8.6E-04 17	9.1E-03 980	2.1E-02 5	5.0E-06 246
00:09----00:39	8.2E-04 16	9.0E-03 980	2.5E-02 7	6.3E-06 256
00:24----00:54	7.4E-04 16	1.2E-02 980	2.8E-02 7	3.6E-06 257

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
00:39----01:09	1.5E-03 16	1.4E-02 980	2.4E-02 6	5.6E-06 267
00:54----01:24	2.1E-03 17	1.3E-02 980	1.3E-02 7	7.8E-06 281
01:09----01:39	1.8E-03 17	1.3E-02 979	8.9E-03 6	4.6E-06 270
01:24----01:54	1.9E-03 17	1.2E-02 979	1.2E-02 5	3.6E-06 272
01:39----02:09	2.5E-03 17	1.2E-02 979	1.2E-02 4	4.2E-06 268
01:54----02:24	2.6E-03 16	1.1E-02 979	1.5E-02 4	3.7E-06 260
02:09----02:39	5.5E-03 16	1.1E-02 979	1.5E-02 4	4.5E-06 256
02:24----02:54	6.2E-03 16	1.1E-02 979	1.5E-02 3	5.8E-06 250
02:39----03:09	3.2E-03 16	1.1E-02 979	1.7E-02 4	6.5E-06 252
02:54----03:24	2.4E-03 16	9.5E-03 979	1.8E-02 6	8.4E-06 257
03:09----03:39	2.0E-03 16	8.9E-03 979	1.8E-02 9	9.5E-06 262
03:24----03:54	2.0E-03 16	9.2E-03 980	1.8E-02 9	6.6E-06 270
03:39----04:09	2.2E-03 16	1.0E-02 980	1.9E-02 10	3.1E-06 282
03:54----04:24	1.7E-03 16	1.0E-02 980	1.9E-02 14	3.9E-06 286
04:09----04:39	1.2E-03 16	1.0E-02 980	1.8E-02 16	4.5E-06 287
04:24----04:54	1.1E-03 15	1.0E-02 980	1.9E-02 16	1.6E-06 287
04:39----05:09	1.9E-03 15	1.0E-02 980	2.1E-02 15	1.0E-06 287
04:54----05:24	3.1E-03 15	1.0E-02 980	2.0E-02 13	1.0E-06 282
05:09----05:39	3.1E-03 15	1.0E-02 980	1.8E-02 13	1.0E-06 277

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
05:24----05:54	2.2E-03 15	1.2E-02 980	1.5E-02 14	2.9E-06 276
05:39----06:09	1.9E-03 15	1.3E-02 980	1.4E-02 12	4.5E-05 273
05:54----06:24	2.1E-03 15	1.3E-02 981	1.6E-02 13	2.7E-04 272
06:09----06:39	2.0E-03 15	1.2E-02 981	1.8E-02 16	8.1E-04 280
06:24----06:54	1.4E-03 15	1.2E-02 981	1.8E-02 19	1.8E-03 289
06:39----07:09	1.0E-03 15	1.3E-02 981	1.8E-02 18	5.6E-03 291
06:54----07:24	8.6E-04 15	1.3E-02 981	1.9E-02 19	1.2E-02 289
07:09----07:39	8.0E-04 15	1.6E-02 981	1.8E-02 23	1.4E-02 289
07:24----07:54	9.7E-04 15	1.9E-02 981	1.5E-02 22	1.1E-02 296
07:39----08:09	1.3E-03 15	2.3E-02 981	1.3E-02 23	1.4E-02 302
07:54----08:24	1.7E-03 15	2.6E-02 982	1.3E-02 25	2.2E-02 302
08:09----08:39	1.9E-03 15	3.2E-02 982	1.3E-02 26	2.6E-02 300
08:24----08:54	1.8E-03 14	4.0E-02 982	1.4E-02 28	3.5E-02 299
08:39----09:09	1.6E-03 14	4.4E-02 982	1.5E-02 28	3.5E-02 299
08:54----09:24	1.6E-03 14	4.3E-02 982	1.5E-02 27	3.6E-02 298
09:09----09:39	2.0E-03 14	3.9E-02 982	1.4E-02 28	3.4E-02 299
09:24----09:54	3.7E-03 13	3.8E-02 983	1.1E-02 26	2.1E-02 306
09:39----10:09	6.6E-03 13	4.2E-02 983	8.0E-03 27	1.8E-02 313
09:54----10:24	7.9E-03 14	5.0E-02 983	6.4E-03 30	1.8E-02 314

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
10:09----10:39	8.7E-03 13	6.0E-02 983	7.0E-03 30	2.0E-02 314
10:24----10:54	3.6E-02 13	7.6E-02 984	8.0E-03 31	2.5E-02 316
10:39----11:09	4.7E-02 14	9.1E-02 984	8.1E-03 31	3.7E-02 314
10:54----11:24	3.2E-02 14	9.6E-02 984	8.2E-03 30	4.2E-02 314
11:09----11:39	2.6E-02 14	8.5E-02 985	8.9E-03 31	3.7E-02 318
11:24----11:54	2.3E-02 14	7.6E-02 985	9.5E-03 31	4.0E-02 319
11:39----12:09	2.5E-02 14	8.1E-02 985	9.5E-03 31	4.3E-02 316
11:54----12:24	1.9E-02 14	9.3E-02 985	1.0E-02 32	5.3E-02 310
12:09----12:39	1.3E-02 15	9.3E-02 986	1.1E-02 30	5.6E-02 311

STATISTICS

NUMBER OF READINGS 968

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	4.46E-04	1.59E-01	5.80E-03	1.13E-02	2.76E-03	2.88E+00
SO2	7.23E-03	1.17E-01	2.77E-02	2.68E-02	1.96E-02	2.17E+00
OZONE	1.00E-06	3.50E-02	1.71E-02	7.21E-03	1.50E-02	2.07E+00
SOLAR RAD	1.00E-06	1.06E-01	1.11E-02	1.76E-02	1.38E-04	8.80E+01
TEMP	13	26	16	2		
BAROMETER	979	989	981	2	981	1
WIND SPEED	0	50	16	11	11	3

S.S.MARIE #25

DATE: JUL 27 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: WHITEFISH ISLAND POINT (70230-51544); 0.7KM & 160DGS/SRC

TIME	H2S TEMP	SO2 BAROMETER	OZONE WIND SPEED	SOLAR RAD WIND DIRECTI
12:51----13:21	1.2E-02 14	1.1E-01 986	9.9E-03 29	3.3E-02 306
13:01----13:31	1.4E-02 14	1.1E-01 986	9.7E-03 30	3.4E-02 308
13:11----13:41	1.4E-02 14	1.1E-01 986	1.0E-02 31	3.4E-02 305
13:21----13:51	1.4E-02 14	1.1E-01 987	1.0E-02 32	3.5E-02 306
13:31----14:01	1.2E-02 13	1.2E-01 987	5.2E-02 31	3.4E-02 304
13:41----14:11	2.2E-02 14	1.3E-01 987	1.0E-01 30	3.8E-02 311
13:51----14:21	2.7E-02 14	1.2E-01 987	1.5E-01 29	3.0E-02 315
14:01----14:31	2.8E-02 13	1.0E-01 987	1.6E-01 29	2.5E-02 310
14:11----14:41	1.8E-02 13	1.0E-01 987	1.5E-01 28	2.3E-02 312
14:21----14:51	1.4E-02 13	1.0E-01 987	1.4E-01 28	2.2E-02 311
14:31----15:01	1.2E-02 13	1.1E-01 987	1.3E-01 27	2.1E-02 308
14:41----15:11	9.4E-03 13	1.2E-01 987	1.3E-01 26	2.0E-02 306
14:51----15:21	1.0E-02 13	1.4E-01 987	1.1E-01 24	2.1E-02 304
15:01----15:31	1.5E-02 13	1.3E-01 987	7.7E-02 25	2.2E-02 311

STATISTICS

NUMBER OF READINGS 163

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.00E-06	6.59E-02	1.61E-02	1.07E-02	1.29E-02	2.53E+00
SO2	8.04E-02	1.76E-01	1.14E-01	2.02E-02	1.12E-01	1.19E+00
OZONE	6.80E-03	1.70E-01	8.05E-02	6.22E-02	4.60E-02	3.42E+00
SOLAR RAD	1.67E-02	4.46E-02	2.75E-02	6.96E-03	2.67E-02	1.28E+00
TEMP	13	15	13	0		
BAROMETER	986	988	987	0	987	1
WIND SPEED	16	39	29	5	28	1

S.S.MARIE #26

DATE: JUL 27 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: WHITEFISH ISLAND POINT (70230-51544); 0.7KM & 160DGS/SRC

TIME	H2S	THC	SO2	THC-CH4
	CH4	OZONE	SOLAR RAD	TEMP
	BAROMETER	WIND SPEED	WIND DIRECTION	
16:07----16:37	3.1E-02	2.7E+00	1.0E-01	1.6E+00
	9.5E-01	8.8E-03	3.3E-02	14
	988	24	308	
16:17----16:47	2.8E-02	2.6E+00	9.4E-02	1.4E+00
	9.0E-01	9.0E-03	3.1E-02	14
	988	24	312	
16:27----16:57	3.4E-02	2.7E+00	8.2E-02	1.5E+00
	9.3E-01	8.5E-03	2.9E-02	14
	988	24	311	
16:37----17:07	2.7E-02	2.6E+00	7.3E-02	1.4E+00
	9.1E-01	8.7E-03	2.5E-02	14
	988	25	313	
16:47----17:17	3.2E-02	2.7E+00	7.3E-02	1.5E+00
	9.6E-01	8.0E-03	2.2E-02	14
	988	24	312	
16:57----17:27	4.3E-02	2.6E+00	7.9E-02	1.5E+00
	9.3E-01	7.8E-03	2.0E-02	14
	988	24	317	

STATISTICS

NUMBER OF READINGS 85

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.26E-02	8.94E-02	3.52E-02	1.89E-02	3.09E-02	1.66E+00
THC	2.00E+00	4.51E+00	2.73E+00	4.66E-01	2.69E+00	1.17E+00
SO2	6.03E-02	1.33E-01	8.88E-02	1.90E-02	8.68E-02	1.23E+00
THC-CH4	7.94E-01	2.27E+00	1.50E+00	2.61E-01	1.48E+00	1.19E+00
CH4	5.56E-01	1.46E+00	9.44E-01	1.68E-01	9.30E-01	1.19E+00
OZONE	4.64E-03	1.34E-02	8.22E-03	1.78E-03	8.02E-03	1.25E+00
SOLAR RAD	1.69E-02	4.30E-02	2.70E-02	6.53E-03	2.62E-02	1.28E+00
TEMP	-20	15	13	4		
BAROMETER	955	989	988	4	988	1
WIND SPEED	13	41	25	5	24	1

S.S.MARKLE #2T

DATE: JUL 27 1978
SCAN TIME: 60 SEC
AVERAGING TIME: 30 MIN
LOCATION: WHITEFISH ISLAND POINT (70230-51544); 8.7KM & 160DGS/SRC

TIME	H2S CH4 BAROMETER	THC OZONE WIND SPEED	SO2 SOLAR RAD WIND DIRECTION	THC-CH4 TEMP
17:45----18:15	5.0E-02 9.2E-01 988	2.6E+00 8.9E-03 28	1.7E-01 3.0E-02 322	1.4E+00 15
17:55----18:25	8.4E-02 9.5E-01 988	2.6E+00 8.8E-03 26	1.6E-01 2.9E-02 325	1.4E+00 15
18:05----18:35	1.1E-01 9.6E-01 989	2.6E+00 8.8E-03 24	1.4E-01 2.4E-02 324	1.4E+00 15
18:15----18:45	1.3E-01 9.4E-01 989	2.6E+00 8.8E-03 25	1.2E-01 2.5E-02 324	1.4E+00 15
18:25----18:55	1.0E-01 9.3E-01 989	2.6E+00 9.1E-03 28	1.2E-01 2.7E-02 323	1.4E+00 15
18:35----19:05	9.4E-02 9.2E-01 989	2.5E+00 8.9E-03 28	1.3E-01 2.8E-02 328	1.3E+00 16
18:45----19:15	8.2E-02 9.3E-01 989	2.4E+00 8.2E-03 27	1.3E-01 2.4E-02 327	1.3E+00 16
18:55----19:25	8.0E-02 9.4E-01 989	2.4E+00 7.4E-03 25	1.3E-01 2.2E-02 325	1.3E+00 15
19:05----19:35	7.3E-02 9.3E-01 989	2.5E+00 7.0E-03 26	1.3E-01 1.9E-02 320	1.4E+00 15
19:15----19:45	6.8E-02 9.3E-01 989	2.6E+00 7.1E-03 28	1.3E-01 1.6E-02 318	1.4E+00 15
19:25----19:55	6.6E-02 9.3E-01 989	2.6E+00 7.4E-03 29	1.3E-01 1.2E-02 318	1.4E+00 15
19:35----20:05	6.7E-02 9.4E-01 989	2.7E+00 6.8E-03 30	1.5E-01 8.7E-03 320	1.5E+00 15

TIME	H2S CH4 BAROMETER	THC OZONE WIND SPEED	SO2 SOLAR RAD WIND DIRECTION	THC-CH4 TEMP
19:45----20:15	7.3E-02 9.5E-01 989	2.7E+00 6.0E-03 29	1.9E-01 5.7E-03 323	1.5E+00 15
19:55----20:25	7.8E-02 9.6E-01 990	2.6E+00 5.3E-03 28	2.4E-01 4.2E-03 324	1.4E+00 14
20:05----20:35	1.5E-01 9.7E-01 990	2.7E+00 4.7E-03 26	2.6E-01 2.8E-03 322	1.5E+00 14
20:15----20:45	1.9E-01 9.9E-01 990	2.7E+00 4.2E-03 24	2.6E-01 2.5E-03 323	1.5E+00 14
20:25----20:55	2.2E-01 1.0E+00 990	2.8E+00 3.4E-03 22	2.4E-01 2.1E-03 324	1.5E+00 14
20:35----21:05	1.6E-01 1.0E+00 990	2.7E+00 2.7E-03 21	2.3E-01 1.7E-03 325	1.5E+00 14
20:45----21:15	1.2E-01 1.1E+00 990	2.9E+00 2.2E-03 20	2.1E-01 1.2E-03 323	1.5E+00 14
20:55----21:25	9.6E-02 1.2E+00 990	3.0E+00 2.1E-03 18	1.9E-01 8.0E-04 321	1.6E+00 13
21:05----21:35	8.0E-02 1.4E+00 990	3.2E+00 2.3E-03 17	1.6E-01 4.2E-04 314	1.7E+00 13
21:15----21:45	6.2E-02 1.4E+00 991	3.2E+00 2.5E-03 17	1.5E-01 1.8E-04 304	1.7E+00 13
21:25----21:55	4.2E-02 1.5E+00 991	3.2E+00 2.3E-03 18	1.3E-01 5.9E-05 297	1.6E+00 12
21:35----22:05	3.2E-02 1.4E+00 991	2.9E+00 3.2E-03 18	1.3E-01 1.6E-05 292	1.4E+00 12
21:45----22:15	2.6E-02 1.3E+00 991	2.5E+00 5.3E-03 17	1.1E-01 6.2E-06 290	1.2E+00 12

STATISTICS

NUMBER OF READINGS 275

POLLUTANT	MINIMUM VALUE	MAXIMUM VALUE	ARITHMETIC MEAN	STANDARD DEVIATION	GEOMETRIC MEAN	GEOMETRIC STD. DEV.
H2S	1.85E-02	5.28E-01	8.82E-02	6.13E-02	7.23E-02	1.84E+00
THC	1.96E+00	4.05E+00	2.60E+00	9.59E-01	2.55E+00	1.14E+00
SO2	7.06E-02	3.05E-01	1.60E-01	5.13E-02	1.51E-01	1.40E+00
THC-CH4	9.11E-01	2.25E+00	1.42E+00	2.04E-01	1.41E+00	1.16E+00
CH4	6.30E-01	1.99E+00	1.08E+00	2.04E-01	1.04E+00	1.19E+00
OZONE	8.72E-04	1.14E-02	5.91E-03	2.11E-03	5.62E-03	1.44E+00
SOLAR RAD	1.00E-06	4.41E-02	1.15E-02	1.13E-02	2.93E-03	9.04E+01
TEMP	11	16	14			
BAROMETER	988	991	990		990	1
WIND SPEED	11	42	24	7	23	1